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BULLETIN of the INSTITUTE of the HISTORY OF MEDICINE

THE JOHNS HOPKINS UNIVERSITY

Editor—HENRY E. SIGERIST

VOLUME IV JULY, 1936 NUMBER 7

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THE JOHNS HOPKINS PRESS

BALTIMORE, MARYLAND

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Correspondence relating to the publication of papers should be addressed to The Editor, Bulletin of the Institute of the History of Medicine, 1900 East Monument Street, Baltimore, Maryland, U. S. A.

Twenty-five reprints without covers will be furnished to contributors free of cost. An order slip for additional reprints, giving the cost, is sent with the galley proof to each contributor and must be returned immediately to the Editor.

Correspondence pertaining to business affairs should be sent to the publishers, The Johns Hopkins Press, Baltimore, Maryland, U. S. A.

The journal is published monthly, except August and September. The volume will comprise about 500 pages.

Subscription is $5.00 a year in the United States and its possessions. In Canada $5.25 a year; in foreign countries $5.50 a year. Single numbers, when available, will be 75 cents each.

This journal will not publish book reviews.

Subscriptions may be entered at any time. However, if feasible and so desired by a subscriber, subscription may begin with the January number.

THE JOHNS HOPKINS PRESS

BALTIMORE, MARYLAND, U. S. A.

PUBLISHED TEN TIMES A YEAR

Made in United States of America

Entered as second-class matter January 3, 1935, at the post office at Baltimore, Maryland, under the Act of March 3, 1879.

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THE LIFE AND TIMES OF RICHARD LOWER, PHYSIOLOGIST AND PHYSICIAN (1631-1691)

EBBE C. HOFF AND PHEBE M. HOFF

From the Laboratory of Physiology, Yale University School of Medicine

The story of Richard Lower begins and ends in Cornwall; there he was born, and there he was buried; there, too, he married, and he sought there a quiet retreat when the court in London turned against him. Like many others he could never quite forget the bleak bare moors of his birthplace, and surely neither Oxford nor London could ever detract from his affection for his own Western country.

Lower came from an old family with substantial possessions. The house in which he was born, Tremeer, near Bodmin, is large, grey, and somewhat austere, but Cornwall does not have the comfortable, spreading old places surrounded by luxuriously planted parks which are the glory of the midland counties. Tremeer appears to have come to the Lower family with Richard's grandmother, Mary Nicholls, who married Edward Lower and whose son Humphrey inherited the house. He married Marjery Billing, widow of Samuel Trelawney;—they had three sons, Edward, Richard and Thomas.

It seems entirely fitting that a man of Lower's particular genius should have come out of Cornwall. The Cornish are an ancient people; and even today their dark, mysterious eyes and delicately

moulded faces recall the many eerie legends which have sprung up about them from the time of the early Phoenicians and before, to the smugglers and wreckers of later years. Combined with a vivid imagination they have a sturdy perseverance, learned after years of struggle against the stony soil and a cruel sea. They are men of high courage, sly cunning and weird humor. Realizing this we shall be able to distinguish many Cornish features in Richard Lower and so understand his character the better. He did not lack either boldness to attack his problems experimentally or skill and patient courage to carry them out; furthermore he had an imagination which, scientifically trained, enabled him to see beyond obvious facts into the unknown.

The first decade of the reign of Charles I (1625-35) was remarkable in many ways: It marked the end of the Elizabethan period of Renaissance of English literature. Francis Bacon died in 1626. Men's renewed interest in letters had turned their minds also towards the discernment of truth in natural philosophy. Harvey's *De motu cordis* had appeared in 1628. Lower was born in 1631, the year of the death of John Donne; in the same year Dryden was born, and about this time Milton's early work was appearing, *L'allegro* and *Il penseroso* in 1631 and *Comus* in 1634. John Locke was born in 1632, and the next year Samuel Pepys appeared on the scene which he did so much to brighten for the twentieth century. It was a time of growing unrest among the Puritans; Charles I had granted a charter to Massachusetts in 1629 and they were emigrating in increasing numbers to New England.

In 1637 the King's supremacy and his policies in Parliament began to be attacked by Eliot and his followers. Charles' undoubted leaning toward Roman Catholicism was countered in Parliament by growing ranks of Puritans against him. Feelings on both sides ran so high that by 1642 they had reached a breaking-point and England was in the grip of a Civil War. These troublesome times before and during the War penetrated even into Cornwall. In 1643 the Cornish, who were for the most part Royalists, rose up on behalf of the King against the Earl of Essex and his Roundhead Army and engaged them in battle at Lostwithiel, not far from Lower's home, a fight in which Essex was defeated and his army routed.

We are told that Lower's father moved to London during this period, although the exact date is not known, so we are uncertain whether young Richard was in Bodmin at the time of the battle at Lostwithiel, or whether he was up in London at Westminster School where his father placed him. The second decade of Charles I's reign ends (1645) with Richard, a boy of fourteen, probably quietly studying behind the Abbey with his schoolfellows, one of whom was Henry Stubbe. Willis, with whom Lower was later to become so closely associated had entered Christ Church, Oxford, 1636, the year in which Ben Jonson had died. Sir Thomas Browne's *Religio medici* was published in 1642, the year of the birth of Isaac Newton. In the following year, John Mayow, also a Cornishman, of an old family in Bree, was born in London, in the parish of Saint Dunstan-in-the-West.

Richard Lower's school days must have been particularly rich in new experiences for him; a boy of his temperament could scarcely fail to have been excited by the events transpiring around him. Cromwell raised his New Model Army in 1645, the same year in which the group of men, who later formed the nucleus of the Royal Society, began to meet in London. Charles was captured in 1645, escaped, and was recaptured the next year. On January 30th, 1649, Charles lost his head and England was proclaimed a Commonwealth; a few months later Richard was elected to his studentship at Christ Church. About this time Wilkins became Warden of Wadham College, and Wren, Boyle, Wallis and Ward all came to live in Oxford, so that now the group of scientists met partly in Oxford and partly in London.

Oxford was a truly remarkable center of scientific culture during Lower's fifteen years at the University. Willis was the Professor of Natural Philosophy; Mayow came to Wadham in 1658 and two years later, when he was only 17, was elected a Fellow of All Souls' College. Millington, to whom Lower dedicated his *Tractatus de corde,* was a Fellow of All Souls' in 1660.

Almost as soon as Lower came up to Oxford he became an assistant of Thomas Willis, and so began an association between the two men which lasted until Willis's death in 1675. Their collaboration was, without doubt, mutually beneficial; Willis was constantly

suggesting research problems to Lower to see whether the experimental fact coincided with his own (Willis') shrewd ideas, while Lower's skill in dissection, and his precise knowledge of anatomy was no less valuable to Willis. Foster (3), as a matter of fact, attributes the scientific renown of Willis almost entirely to the part played by Lower, and in his *History of physiology* speaks of Lower as "a singularly able man, the henchman of the fashionable Willis whose false fame in large measures rests on Lower's unacknowledged work." That Willis was in no sense unmindful of his debt to Lower, nor ungrateful, is, however, apparent in the handsome acknowledgment he makes to Lower in his *Cerebri anatome* (16) published in 1664:

"But for the more accurate accomplishment of this task I had not sufficient leisure, and, perhaps, not sufficient ability, so I was not ashamed to summon the helping hand of others. I employed the assistance and co-operation of Richard Lower, a doctor of outstanding learning, and an anatomist of supreme skill. The sharpness of his scalpel and of his intellect, I readily acknowledge, enabled me to investigate better both the structure and the functions of bodies, whose secrets were previously concealed. With him as my companion and collaborator, scarcely a single day passed without some anatomical dissection; hence in a short space of time everything about the cerebrum and its appendage within the skull seemed clearly revealed and thoroughly explored by us. After this, when we were entering upon a much more difficult task, the dissection of the nerves, the really wonderful dexterity of this worker and his untiring perseverance were conspicuous in the extreme, and no obstacle could withstand his effort. Tracing most accurately, wherever they wandered, all the branchings of any particular nerve, however small, or however buried among other bodies or complex; unravelling the twistings of the branches and offshoots of any particular pair in their long and widespread course: he set down with his own hand outlines or plans of the same, such as appear in this treatise, as well as of many blood channels. So that these on their appearance should be faithful and scrupulously correct, without any suspicion of untruth or damaging mistakes, he saw to it that the plate contains scarcely any small line or most slender channel, the shape and exact character of which were not proven by reference to several animals, killed to that particular purpose." (Translated by Franklin, 4).

Nor was Lower by any means displeased with his teacher and colleague, if we judge by his first publication, *Diatribae de febribus* (8)—a vindication of Dr. Willis' treatise on fevers.

On February 17th, 1653, Lower took his B. A. degree, and the

following June his M. A. This was the year in which Cromwell was proclaimed Lord Protector of England. The Civil War period and the succeeding years of Puritan dominance saw a tremendous increase in English prose writing. There was little or no drama, the theatres had been closed in 1642; poetry was represented mainly by Cavalier lyrics and men were reading and writing chiefly sermons, tracts and controversial pamphlets on religion, morals, politics and science.

In 1659 Robert Boyle brought Peter Sthael to Oxford to give public teaching in chemistry. It appears that Lower studied under Sthael in company with Wren and Millington. Chemistry was in a very rudimentary state in those days, and was still in bad odor because of its ancestor, alchemy. It was considered a degrading occupation, akin to witchcraft, and one not really worthy of study by gentlemen. In Dr. Shaw's edition of the Philosophical works of the Honourable Robert Boyle (2) he says, " Mr. Boyle has been censured by some learned men, for cultivating an art which they apprehend to be unworthy of him," but chemistry, " is so far from being an employment unworthy of a gentleman and a philosopher; that it is one of the principal whereto he ought to addict himself, who wou'd improve either philosophy or physic." In this belief Boyle brought Sthael to Oxford, a man whom Antony à Wood (who also attended his classes) described in his *Diary* (18) as " the noted chemist and Rosicrucian Peter Sthael of Strasburgh in Royal Prussia, . . . who was a Lutheran and a great hater of women, was a very useful man."

The various forms of the earth's elements were considered by Paracelsus and others to be principally compounds formed of the three elementary substances, salt, sulphur and mercury. All combustible materials, it was taught, were compounds of salt with sulphur; for sulphur was the substance which gave a compound the property of burning. As heat was applied to such a combustible material the sulphurous particles held within it were thrown into a violent turmoil described as " effervescence " and in the consequent friction and bubbling of the particles, the subtle " spirit " of the fire was released. This view had an important influence on ideas concerning the propulsion of the blood. Since the body grew cold

when the heart stopped beating men commonly believed that the heart generated heat which was imparted to the blood. The left ventricle received blood drop by drop, which becoming mixed with a ferment within this chamber (apparently sent there by the vessels of the heart itself) induced an " efferverscence " or ebullition which not only kindled and heated the blood but also by its bubbling drove it out of the heart. The heart-beat was regarded as a phenomenon accessory to this bubbling of the blood into the aorta. The chemistry of respiration was in a similar state of confusion: Some supposed that the purpose of respiration was to cool the blood drawn into the lungs. There it was condensed and returned to the left ventricle in a form more suitable to the production of the ebullition that was to force it out into the arteries. Others, on the contrary, held that the respiratory movements were useful only to propel the blood to and fro in the vessels. The passage of air in and out of the lungs was an incident without physiological significance. All these were matters which, as he heard them from Sthael and others, deeply stirred Lower's critical faculties.

During his life in Oxford as a student of medicine Lower appears to have had good friends. One of these was Anthony à Wood, who was also one of his patients. The two seem to have been very congenial, and Wood, who was not averse to making rather crusty references to his Oxford contemporaries, always wrote of Dick Lower as if with pleasure. They often went around to the popular Oxford taverns and cookshops together, and in the period of 1657-65 we find numerous references to such meetings in Wood's notebook (18) as for example:

1657. " November—The 2 day, M. spent at Jeane's with Mr. [Richard] Lower 6d.

1659. " June 24 F. Spent with Mr. [John] Curtenye, [Richard] Lower, and [Timothy] Nurse at Mother Joneses. 1s.

1661. " July 13, S., at Harper's with Mr. [Richard] Lower, 8d.; the same at Earle's in cider 5d; the same, a paire of gloves, 1s.

1662. " August 8 F. With Dick Lower at Bolls, 2d.; with him and Mr. [John] Curteyne at mother Harwood, 5d."

For January 1633/34 we find this somewhat amazing entry:–

" . . . my friend Mr. R. L. told me, as he was cutting up a calf's head on a

Sunday morning about 8 of the clock in his study, his dore stood so much open as that he might thrust his fist throug: and hearing a russelling in his chamber, looked through that open space of his doore and saw the appearance of a beautifull yong man with long flaxen haire to his middle and a silke studying gowne on: and going to his study doore and oping it asked 'Who is there, Sir John?' (meaning Sir John Hales who was his opposite neighbour): and going out into his chamber and seeing noe body, looked in his other study and nore there neither. Then he went to his chamber doore, and that was shut and lached and could not be opened and shut without noise. And opeing the doore Sir J[ohn] H[ales] come out of his owne, who (i. e. R. L.) asked him whether he was in his chamber who (J. H.) answered faithfully that he was not. Whereupon he took this to be an appearance."

Another entry that reminds us of Lower's Cornish origin is that of 18 Apr. M. 1664.

"Dr. [John] Wall's bedmaker, a maid in St. Ebb's parish, died of a fever about 6 or 7 at night. At 10 of the clock of the same day Mr. R. L. a phisitian came to see her, and felt her pulse. And as he was a feling it, he saw something as bigge as a bat hovoring or flying over her face and brest as t'were a circle close to her. The roome wherein she was, was somewhat dark and the shadow or bat made a shadow on her brest or clothes upon her darker. About 3 in the afternoone, she was light-headed and talked much of the devill and that she should be let down into hell, and called her brother who came to see her 'Devill'. She was the daughter of old . . . Harris the painter and the wife of one . . . Greslee."

In 1665, the year of the plague, Lower published his first work, *Diatribae de febribus* (8). This was a spirited vindication of Willis' book, published in 1653 (dated 1659) entitled *Diatribae duae medico-philosophicae,* etc., which had been attacked by an Irish physician, Edmund O'Meara in a tract published in 1665 (imprimatur, Oct. 27, 1664). Lower's book is chiefly interesting to us for its discussion of the changes in colour which the blood undergoes in passing through the lungs and heart. Willis and Lower both knew by this time that arterial blood was bright and crimson, while venous blood was dark and blackish. Lower, however, made the error of stating that the blood returning from the lungs in the pulmonary vein was also dark, and that the change in colour was not effected until the blood became mixed and kindled in the left auricle. The question of the reason for this difference in colour of arterial and venous blood was one which Lower considered of

greatest importance. On June 24th, 1664, in a letter to his friend and former teacher, Robert Boyle, he said that he intended to study "the reason of the different colour of the blood, the one being florid and purple-red and the other dark and blackish." As we shall see, Lower apologised for his mistake and corrected himself with regard to the colour of the blood returning from the lungs in his *Tractatus de corde* (9) in 1669 showing that the blood entering the lungs was dark and blackish, while that leaving the lungs was crimson and arterial. The blood derived its new colour from some quality absorbed from the air.

On June 28th in the same year, 1665, Lower received the degrees of Bachelor and Doctor of Medicine. In February of that year Wood (18) wrote "Dr. [Richard] Lower practized the transfusion of blood at Oxford." The experiment was apparently suggested to him by Christopher Wren (Gotch, 6), although there is no acknowledgment to Wren in any of Lower's writings. Wren and Boyle had given opium and other drugs intravenously to dogs in 1656, and the question of whether blood itself might be transfused into veins could naturally have suggested itself to Lower. On the 26th of June 1666, Boyle asked Lower for a statement for the Royal Society describing the method of transfusion. Boyle's request and Lower's compliance was indicated in the following letters (7):

"London, *June 26th*, 1666. I was present last Wednesday (Honourable Sir) at the stated meeting of the Royal Society, held in Gresham's College. Here I heard from Dr. Wallis that you had at last (in his presence) successfully accomplished that most difficult experiment on the transference of blood from one to the other of a pair of dogs. I judged the matter clearly worthy of being communicated to that very celebrated assembly. I therefore proposed that they should ask that distinguished gentleman for an account of the way in which it had been performed. His description of it was such as to increase not a little our opinion of your reputation. But, when asked for various details about so unusual and so unhoped-for an experiment, he voiced the opinion that it would be more profitable for you to reply in writing about the individual points than for him to attempt it orally. I therefore stated publicly that you had promised me, a little while before, that you would describe the matter to me . . . I have done so with less reluctance, because I thought it would be to your advantage, if this celebrated assembly became acquainted with you at this propitious moment. There are many among its members who

esteem you at your right worth and are your friends, but none more so than Yours affectionately

Rob. Boyle.

To be delivered to
my most honourable friend
Richard Lower, Doctor of Medicine. Oxford."

"Oxford. *July 6th* 1666.

I have received you letter, Honoured Sir, and, in accordance with your request, I will briefly expound to you the whole technique of transfusion in the same order as that in which I performed it. In a dog, then, or any other animal, whose blood you wish to transfuse into another animal of the same or of a different species, first lift up one Cervical Artery . . . ligature the upper, brainwards, portion firmly and tightly. . . . Next, lower down toward the heart, apply a second ligature to the same vessel at half a finger's distance from the aforesaid cord, using a slip-knot so that, as need arises, you can at will tighten or slacken the cord. When you have so placed your two ligatures in position . . . open the vessel with a scalpel and insert a quill into the incision in the direction of the heart. . . . In addition pass the aforementioned strings closely round the portion of the artery enclosing the quill and tie them tightly.

"In the second animal, which is to receive the blood of the first, clean a small part of the surface of the Jugular Vein about half a finger long, and apply a ligature at each end. . . . Two strings again should be passed under the vein, in the intervening space, and, when the incision is made, two quills are to be inserted into the opening. One of these is directed towards the trunk of the descending vena cava, and is to receive blood flowing in from the other dog; the second is pushed upwards toward the brain, and is to discharge the Animal's own blood into suitable vessels. . . .

"When you have done this you lay the dogs on their side and fasten them closely together as best you may to insure the connexion of the two quills. . . . Quickly tighten a noose round the neck of the receiving Animal as in venesection, or at all events, compress the vein on the opposite side of the neck with your finger, then take out the stopper and open the upper Jugular Quill, so that, while the foreign blood is flowing in through the Lower Quill, the animal's own blood flows out from the upper into suitable receptacles . . . . until at last the second animal, amid howls, faintings, and spasms, finally loses its life together with its vital fluid.

"When the tragedy is over, take both quills out of the Jugular vein of the surviving animal, tie tightly the former slip-knots, and divide the vein. . . . After the vessel has been divided, sew up the skin, slacken the cords binding the dog, and let it jump down from the table. It shakes itself a little, as though just aroused from sleep, and runs away lively and strong, more active and vigorous, perhaps, with the blood of its fellow than its own.

. . . " I have written this to fulfill the pledge given by you on my behalf to the most illustrious Society, and further, that you may know that you will never find me wanting in any good-will or duty towards you.

Yours most respectfully, Richard Lower

To be delivered to
The Honourable Dr. *Robert Boyle*
in London.

Using this method, Dr. Edmund King, assisted by Thomas Coxe, transfused blood from one dog to another at a meeting of the Society on November 14th of the same year. Pepys (13) has several references to the experiment:

" November 14th 1666. Here Dr. Croone told me, that, at the meeting at Gresham College to-night, which, it seems, they now have every Wednesday again, there was a pretty experiment of the blood of one dogg let out, till he died, into the body of another on one side, while all his own run out on the other side. The first died upon the place, and the other very well, and likely to do well. This did give occasion to many pretty wishes, as of the blood of a Quaker to be let into an Archbishop, and such like; but, as Dr. Croone says, may, if it takes, be of mighty use to man's health, for the amending of bad blood by borrowing from a better body."

There are several subsequent entries with respect to the dog's health and discussions of the significance of the experiment.

In 1666, Dr. Willis, at the invitation of Dr. Sheldon, Archbishop of Canterbury, went to London where he set himself up in St. Martin's Lane. His Oxford reputation preceded him so that very soon his practice and income were second to none in London. Lower followed him later in the year, settling first in Hatton Garden, and later near Covent Garden. In September, during the Great Fire which burned in London from the second until the seventh of the month, Lower was down in Cornwall staying at Tremeer. On November 17th he married a Cornishwoman, Elizabeth, daughter of John Billings, a marriage which brought him estates near Tremeer.

He was made a Fellow of the Royal Society on October 17th, 1667. The Oxford nucleus of the Society had, for the most part, returned to London in 1658, and two years after the Restoration (1662) the Royal Society was incorporated under the patronage of

Charles II, himself a fair chemist. On November 23rd, 1667, Lower and Edmund King demonstrated blood transfusion in man to the Society. Pepys (13) speaks of this on November 21st, 1667, as follows:

"among the rest they discourse of a man that is a little frantic, that has been a kind of minister, Dr. Wilkins saying that he hath read for him in his church, that is poor and a debauched man, that the College have hired for 20s. to have some of the blood of a sheep let into his body; and it is to be done on Saturday next. They purpose to let in about twelve ounces; which they compute, is what will be let in in a minute's time by a watch. They differ in the opinion they have of the effects of it; some think it may have a good effect upon him as a frantic man by cooling his blood, others that it will not have any effect at all. But the man is a healthy man, and by this means will be able to give an account what alteration, if any, he do find in himself, and so may usefull."

Lower had transfused in Oxford from the artery of the donor to the vein of the recipient. However, King improved the method by transfusing from vein to vein. Pepys (13) on November 30th says of the victim of this transfusion, one Arthur Coga:

"But here, above all, I was pleased to see the person who had his blood taken out. He speaks well, and did this day give the Society a relation thereof in Latin, saying that he finds himself much better since, and as a new man, but he is cracked a little in the head, though he speaks very reasonably, and very well. He had but 20s. for his suffering it, and is to have the same again tried upon him: the first sound man that ever had it tried on him in England, and but one that we hear of in France, which was a porter hired by the virtuosos."

The account of the effects of the transfusion given by the victim himself is very amusing: (7)

"To the Royal Society The Virtuosi, and all the Honourable members of it, the Humble Address of AGNUS COGA. Your creature (for he was his own man till your Experiment transform'd him into another *species*) amongst those many alterations he finds in his condition, which he thinks himself oblig'd to represent them, finds a decay in his purse as well as his body, and to recruit his spirits is forc'd to forfeit his nerves, for so is money as well in peace as warre. 'Tis very miserable, that the want of natural heat should rob him of his artificial too: But such is his case; to repair his own ruines (yours, because made by you) he pawns his cloaths, and dearly purchases your sheeps blood with the loss of his own wool in this sheep-wrack't vessel of his, like that of *Argos*, he addresses himself to you for the Golden Fleece. For he

thinks it requisite to your Honours, as perfect Metaplasts, to transform him without as well as within. If you oblige him in this, he hath more blood still at your service, provided it may be his own, that it may be the nobler sacrifice.

The meanest of your Flock,

AGNUS COGA."

In Paris, Jean Denis performed a successful transfusion in man in June 1667, and since he apparently wished to assume priority for the invention, the Publishers of the *Philosophical Transactions* printed a statement in October in which the Royal Society claimed a great deal of credit for the discovery, although acknowledging that it was Dr. Lower who had discovered the method and carried it out in Oxford.

We should not dismiss the subject of blood transfusion without reference to the unsuccessful experiments of Francis Potter. He was an eccentric man who spent twenty-seven years at Trinity College, Oxford, and was afterwards Vicar of Kilmanton in Somerset. He had an absorbing interest in mechanics and inventions, and we are told by Wood (8) that as early as 1640 he had the idea of curing diseases by blood transfusion. Aubrey (1), who was a great friend of Potter's, in recounting his life, makes a " Memorandum that att the Epiphanie, 1649, when I was at his house, he then told me his notion of curing diseases, etc., by transfusion of bloud out of one man into another, and that the hint came into his head reflecting on Ovid's of Medea and Jason, and that this was a matter of ten years before that time. About a yeare after, he went to trye the experiment, but 'twas on a hen, and the creature to little and our tooles not good: I then sent him a surgeon's lancet. And . . . I received a letter from him concerning the subject, which many yeares since I shewed, and was read and entered in the bookes of the Royall Societie, for Dr. Lower would have arrogated the invention to himselfe, and now one Dr. of Physique of Richmond, is publishing a booke of the transfusion of bloud, and desires to insert Mr. Potter's letter: which I here annex in perpetuam rei memoriam."

" Worthy Sir,

I am sorrie that I can as yet give you no better account of that experiment of which you desire to heare. I am as yet frustrated *in ipso limine* (but it is

by my owne inexpertnes, who never attempted any such thing upon any creature before): for I cannot, although I have tried divers times, strike the veine so as to make him bleed in any considerable quantity.

"I have prepared a little cleare transparent vessel (like unto a bladder), made of the craw of a pullet; and I have fastened an ivory pipe to one of the neckes of it, and I have put it into a veine which is most conspicuous about the lowest joint of the hinder legges; and yet I cannot procure above 2 or 3 drops of blood to come into the pipe or the bladder. . . . Sir, I humbly present my service and best wishes unto you, and shall still be Yours, in all true affection, to be commanded

FFRANCIS POTTER.

Kilmanton, Decemb. 7°, 1652.

In 1669 Lower published *Tractatus de corde* (9) which was undoubtedly his greatest work. The book was written, he explained, to treat of those matters which Harvey had promised to write of but had never done. The style is crisp, direct and to the point, and in Dr. Franklin's Translation (7) is reminiscent of the English of the period, and withal, reads very much like a modern treatise on the heart. In the first chapter, dealing with the structure and position of the heart, Lower describes the anatomy of the pericardium, the function of the pericardial fluid, and the innervation, vessels, and valves of the heart. He takes great pains to dissect the cardiac muscle, which he accurately represents, and which he demonstrates are muscles similar to those of the limbs with power to contract forcefully. The comparative anatomy is discussed very briefly indeed.

In the second chapter he criticises those who, like Descartes, believed that the blood moved by "ebullition" from the left ventricle,—the blood does not drip into the ventricles and there boil up because it interacts with a ferment in the left chamber; it is ejected by the forceful muscular contraction of the heart. This contraction does not depend upon the blood, for the heart will beat even when cut completely out of the body, and as he shows by experiment, even if the blood of an animal is replaced entirely by beer and wine, the heart will beat for a short while after. The heat of the blood does not depend any more upon the heart than on any other organ, as one sees by feeling the heart or inserting a finger into one of the ventricles of a beating heart. As to the origin of the heart beat, Lower confesses his ignorance, saying:

"I should here speak of the ultimate way in which the heart's movement is effected, but, as it is over-difficult to obtain any due conception of this, and it is the privilege of God alone, who comprehends the heart's secrets, to understand its movement also, I will not waste effort in examining it further."

He evidently believed that the heart beat was of nervous origin, for he says:

"it will suffice, therefore, if I merely observe that the force and strength, by which the heart expels with regular, even beat the blood that falls continuously into its chambers, do not arise from anything within the heart, but come down into it from the head above, as if from heaven. The heart is, functionally, extremely important and necessary, and nature therefore exerts such care and solicitude in the execution of its movement, that, in addition to the important nerve-branches distributed thickly all over it, she has also prepared the cerebellum as a perpetual storeroom of animal spirits, so that there may be a continuous flow of them into the heart . . . if the nerves of the eighth pair "(vagus)" are tightly ligatured in the neck or are divided it is remarkable how great a change suddenly occurs! The heart, which before beat quickly and regularly begins to palpitate and quiver as soon as the ligature is applied; the wretched animal prolongs a weary life for a day or two to the accompaniment of heart-tremor and excessive dyspnea, and finally dies without warning (7)."

In Chapter III Lower describes very carefully his experiments on the movement of the blood and its colour. After making an estimate of the output of the heart per hour he shows that the red colour of the blood is due to its contact with the air in the lungs. If air is excluded the blood flowing in the pulmonary veins will turn black, but when air is readmitted it is again crimson. If air is pumped through the lungs which are pierced with holes, the blood is transformed in colour the same as it is when the chest moves. Further, if blood is collected from the veins of a strangled animal and allowed to set, it becomes brightly coloured on top; if this part exposed to air is cut away and more of the blood clot exposed, it too becomes red, and so on. The blood of a strangled animal becomes crimson if it is whipped up in the air. Lower thus established the basis for an understanding of the true nature and use of respiration to supply to the blood a quality from the air which is essential to life. In his experiments on transfusion he showed that if crimson arterial blood is injected into an animal that is gasping from want of air, when the new blood enters the animal

immediately appears refreshed and scarcely needs to breathe at all, because its arteries are full of red blood imbued with the spirit of the air. The experiments of the chapter above assure Lower a place in the history of medicine as the greatest physiologist of the seventeenth century after Harvey. He is the direct successor of Harvey, and he doubtless furnished Mayow, who witnessed many of these experiments, with a sound basis for his work on respiration.

Chapter IV is devoted to the transfusion of blood, Lower builds up the proof of priority of his own concepts and describes experiments which we have already considered. Finally, in the last chapter he discusses the passage of chyle up the thoracic duct into the blood stream. He disposes of the old view that the spleen supplies the acid menstruum necessary for the proper digestion of food. There are no ducts from the spleen to the stomach, and, furthermore, a dog with its spleen removed will eat and digest as well as a normal animal. The chyle does not pass into the mesenteric veins, but flows only into the thoracic duct. Lower had no idea of the absorption of sugars directly into the blood stream.

Lower's second work was a tract entitled *Bromographia* (10), a book published in Amsterdam in 1669; on the uses of barley water. As Dr. Fulton (5) has pointed out, it contains nothing new, and there is some doubt whether Lower really wrote it. Surely it is curious that a London edition was not published at the same time, although it is possible that the book was not well received and Lower, therefore, wished to suppress it.

De origine catarrhi (11) appeared appended to the second edition of *Tractatus de corde* in 1670, and was published separately in London in 1672. This brief tract, of about twenty pages, overthrows the classical idea that the discharges of the nose are the product of an overflow of fluid from the brain via the pituitary gland and the cribriform plate of the ethmoid bone. Lower refers to the discharges of the brain on pages 150-151, of *Tractatus de corde*. In *De origine catarrhi* he describes a series of experiments in which, after removing the calvarium, he injected the jugular vein with water under considerable pressure and, although fluid appeared in the ventricles and infundibulum, none flowed into the nose or pharynx. He concludes that the fluids of the nose and the "hu-

mour" of the eyes and ears are produced by secretory processes in these organs, and suggests, therefore, the abolition of those remedies which were intended to "purge the brain."

Finally, we may mention the *Receipts* (12), a volume of simples published in London in 1700, supposed to contain prescriptions of Dr. Lower. The question of their authenticity is discussed by Fulton (5) who has also prepared a complete list of Lower's contributions to other works, principally to the *Philosophical Transactions* of the Royal Society.

In 1671, on December 22nd, Lower was accepted as a candidate of the Royal College of Physicians. On the death of Willis in 1675 he succeeded him as Court Physician, and was also elected Fellow of the Royal College of Physicians. This year marks the height of his prosperity and the zenith of his career in London. There was no one more highly thought of as a doctor in the Court than the celebrated Dr. Richard Lower. The Restoration of the monarchy in 1660 had brought with it a Court that was brilliant and artificial, famous for its gay, extravagant life. Charles and his courtiers brought back with them French styles in dress and furnishings, and in almost every side of fashionable life continental influence was to be seen. Drama and literature came to be equally affected; the theatres were, of course, reopened; and the plays were of two kinds, the colourful, risqué comedies of Wycherley and Congreve, and the serious heroic drama of Dryden. This was the beginning of the great age of Classicism in England, when all serious verse in poetry and drama must be written in heroic couplets. Prose style changed very clearly, from the elaborate Latinized sentences of the late Elizabethans such as Sir Thomas Browne, and learned Puritans such as Milton and Burton, to the clear and simple wording of Dryden and the great scientists. It was the latter group which played a very important part in the development of modern English prose. In order to report their experiments accurately they used a concise, unambiguous style, free from the flowery descriptions and analogies which had been so beloved by their predecessors.

Although the influence of Charles II served as a great impetus to English letters and science, nevertheless, the excesses of his

Court won him many foes among the common people. *The Book of Common Prayer* was established as the only legal form of worship by the Act of Uniformity in 1662, and, as a result of this, many Puritans were driven from their parishes. It was a period of violently conflicting religious and political opinions, and this conflict was partly expressed in the growth of two opposing political parties, the Whigs and the Tories; the former were on the whole Puritans, and Dissenters, while the Tories represented the high churchmen, but not the Roman Catholics. Evidence of dominance of the Tories is seen in their passing of the Test Act in 1673, which required all men in civil and military employment to vow allegiance to the King and to receive the sacrament according to the rites of the Church of England. The secret treaty of mutual aid which Charles II entered into with the Catholic King of France, Louis XIV, makes it clear that Charles himself had definite Catholic leanings.

In 1678, the whole country, led by the Whigs, rose up against the Catholics and the heir to the throne, James, Duke of York, as a result of the revelations of the Popish Plot. This was actually a series of lies invented by one Titus Oates revealing a colossal plot to murder the King, put James on the throne, and inflict Catholicism forcefully on the country. At this time Richard Lower, together with many others, declared adherence to the Whig party. Anthony à Wood attributes Lower's stand to his belief that the Whigs were firmly established in power, and implies that he was influenced by purely selfish motives. However Lower's sympathies had always been with the low church and he truly regretted the extravagance of the Court. Like most Cornishmen he was deeply interested in politics. Wood in his account of Lower (17) quotes Bishop Kenet:

> "I have heard Dr. Tenison, Archbishop of Canterbury, say often of him that Dr. Lower was his special friend and had the Protestant interest much at heart, and was for that reason a great lover of news, and used to shew that humour in every visit he made. He went very often to Nell Gwynne, and would pick out of her all of the intrigues of the Court of King Charles. II. He was heartily against a Popish successor, and against the proceedings of the Court of James II, and that King himself was used often to complain of him, and say, he did him more mischief than a troop of horse."

In the elections following the Popish Plot the Whigs were returned to Parliament by a large majority. However, they were so violent in their dealings with the Tories that, in fear of a Roundhead revival, many people in England went over to the Tories and the Crown. In 1681 Charles dissolved the hostile Parliament at Oxford and appealed directly to the people in a Declaration which was responded to by a wave of loyalty. The downfall of the Whigs was assured when a plot was revealed in which a group of Whig extremists planned to kill Charles and his brother on their way home from the Newmarket Races (The Rye House Plot). Charles II died in 1685 after several days' illness, during which Lower is known to have attended him; he was present also, with Scarburgh, Millington, Short and others, at the King's death.

Shortly after the accession of the Catholic James II, Lower was deprived of his position at the Court. His practice, which had been decreasing since the collapse of the Whig party, had fallen largely into the hands of Dr. Thomas Short. It is worth noting that on Short's death, in 1685, this practice was taken over by Dr. John Radcliffe.

During the brief reign of James II it is probable that Lower spent much of his time in Cornwall, where his mother died in 1686. The King relentlessly punished all those who had opposed him, as exemplified by the cruel verdicts of the Bloody Circuit. He tried to impose his authority even on Magdalen College, Oxford, where the Fellows accepted expulsion rather than James' Catholic nominee for President.

Lower did not live long to enjoy the more tolerant reign of William and Mary, which began in 1689. He died in his house in King Street, Covent Garden, in London, on January 17th, 1690/1. He had caught a chill while helping to put out a chimney fire in his house a few nights before. His body was taken back to Cornwall and buried, where he had been baptized 59 years before, in the parish church of St. Tudy.

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NOTES ON INSECT CONTAGION *

PALMER HOWARD FUTCHER

One may divide the animal kingdom, considered from a purely utilitarian point of view, into three somewhat overlapping groups. In one class are the animals which have proven so useful to man that he has honored them with a place in his house or barn and dubbed them "domestic." The second category is composed of creatures which although not generally tame, provide a source of food and are considered desirable in a multitude of ways—deer, birds, and fishes, for example. Finally we have animals which are enemies of man, and it is with this last group that this paper deals. For while the phylum *insecta* includes the valuable bee, and some of its members are important in the fertilization of plants, the word "insect" has come to connote generally an organism inimicable to human welfare—be it a gypsy moth or a mosquito. From the very beginning primitive man must have been bothered by insects of all sorts and have attempted to avoid them. Not that he had any inkling that this or that one carried a particular disease. It was enough to know that their stings caused pain and swelling to a greater or a lesser extent and that they seemed to breed in such unpleasant places as swamps and refuse heaps. So *Pithecanthropus erectus* probably avoided a marsh when possible, and his Aurignacian cousin in Spain and France burnt a smudge at the entrance to his cave lest gnats disturb the palaeolithic interior decorator at work on a wall-painting of a charging boar or bison.

The very fact that man is so acutely aware of the immediate effects of an insect bite presents a complication in any attempt to study the history of the understanding of the relation of insects to disease. A person is stung, writes the chronicler, be he of 3000 B. C. or 1800 A. D., the part affected swells and is painful, and the subject becomes feverish. Is the reader to see in these symptoms, (often described without any intimation of temporal relationships),

* Dr. W. G. MacCallum kindly gave permission for the publication of this essay, which was written in connection with the second year course in Pathology at the Johns Hopkins Medical School.

merely the primary result of the insect's irritating poison, or an actual syndrome of some disease inoculated by the bite? Very likely the immediate irritation of the bite distracted the physician from associating the incident with the delayed appearance of a disease of which the insect in question was actually the vector. Summarizing, man has always regarded insects as harmful, and in the writings of every period one finds ascribed to them many diseases. Now and then someone suggested that they carried well known contagious diseases—the plague, for instance.

One can tritely say that nothing was definitely proven until the experimental technique of the latter nineteenth century came to the aid of medicine. The advent of this new era brought advances too comprehensive for the scope of this brief paper. Rather, an attempt will be made to give scattered notes on the earlier history of the theory of insect contagion, with mention of a few men, some of whom, had they lived during the years 1850 to 1900, might have been fated to rank with Manson, Finlay, Smith, and Ross.

Among the most interesting of the relics of Babylonian civilization which archaeologists have unearthed are the so-called "seal cylinders" (25). These little clay cylinders, often not more than an inch and a half high and inscribed with the merchant's motto, served the ancient Mesopotamians as seals to lend an official note to letters, bills of sale, and receipts. They date back at least to Hammurapi, (2100 B. C.) (21). These cylinders were also carried as amulets to ward off evil spirits, and from them and from other documents of the period investigators have been able to piece together some of the details of Babylonian religion. It involved two opposing groups of spirits whose influence upon mankind was for either good or bad. Medicine as well as religion consisted almost entirely in incantations to this good spirit to lend a helping hand, to that bad spirit to leave the body of the patient. Of the bad demons Nergal, god of destruction and pestilence, is of particular interest to us (16). Under his command were fourteen minor evil spirits, some capable of causing groups of symptoms in humans which modern authorities consider identical with certain disease entities recognized today.

In the inscriptions on the seal cylinders the pestilential Nergal was represented by the likeness of a very recognizable two-winged fly. Ward and others (19, 21, 25) describe several of these amulets, which generally portray the God in anthropomorphic form identified by the appropriate symbol (in this case the fly) beside him. Generally there is a short prayer inscribed around the cylinder in cuneiform characters. For instance, "May Nergal hearken to his name; may Sharnash lift him up." Offord (19) describes another cylinder with a conjuration against "mosquitoes," obscurely calling them to fly away from the amulet's possessor and connecting the insects somehow with refuse. Although the Babylonians recognized several species of diptera and hymenoptera, there is no evidence to suggest that this association of flies with disease springs from reasoning greatly deeper than the primitive associations mentioned in a preceding paragraph.

It is possible that somehow the Canaanites, dwelling on the shores of the Mediterranean Sea, were influenced by the beliefs of the Mesopotamians to the east of them. Macalister (17) tells us that when the Philistines left their island of Crete and made their homes in Canaan (c. 1400 B. C.) they assimilated into their own culture the customs of the people already dwelling there. The new arrivals at the city of Ekron probably found prevalent there a belief in a local divinity with an established lordship over flies—Baalzebub, "god of flies." The original conception of this god was perhaps in the form of one of the species of insect that plagued the district, i. e., house and sand flies and mosquitoes; it is not certain that he was regarded definitely as a "fly-averter." Perhaps the god gave his oracles by the movements of flies; Macalister quotes from Lenormant's *La divination chez les Chaldéens* that the Mesopotamians read the future from the manner in which flies settled on an omen tablet and the Philistine technique may have been similar. At any rate the temple of Baalzebub gained great fame throughout a land where soothsaying was a highly developed art (Isaiah II, 6). The oracle's reputation spread among the neighboring Jews, and we read that Ahaziah on his sick bed sent to Ekron to inquire as to the outcome of his illness and paid for his idolatry with his life (II Kings I, 2). Baalzebub came finally to

signify the personification of evil among the Jews; hence his pseudonym "prince of the devils" (Matthew XII, 24). Macalister believes that ancient Ekron exists today as Dhikerin, near which still stands the Deir Dhubban, or "Convent of the Fly."

Probably in the fly-averting Ζεὺς ἀπομύιος of Pliny (23-79 A. D.) one recognizes a Philistine influence. To quote Philemon Holland's famous translation of the *Historia mundi naturalis* (23), "Certes, a straunge thing it is of these flies, which are taken to be as senselesse and witlesse, yea and of as little capacitie and understanding as any other whatever; and yet at the solemne games and plaies holden everie fifth yeare at Olympia, no sooner is the bull sacrificed there to the Idoll or god of Flies called Myoides (this Idoll of the Painims I take to be called in the holy Scripture Beel-zebub), but a man shall see (a wonderful thing to tell) infinit thousands of flies depart out of that territorie by flights, as it were thick clouds." Bringing superstition even closer to our times, Macalister quotes from the *Statistical Account of Scotland* a description of the holy well of St. Michael in the parish of Kirkmichael, Banffshire, reputedly endowed with healing properties. "Many a patient have its waters restored to health . . . But as the presiding power is sometimes capricious and apt to desert his charge, it now (1794 A. D.) lies neglected, choked with weeds, unhonored, and unfrequented. In better days it was not so; for the winged guardian, *under the semblance of a fly,* was never absent from his duty. If the sober matron wished to know the issue of her husband's ailment, or the love-sick nymph that of her languishing swain, they visited the well of St. Michael. Every movement of the sympathetic fly was regarded in silent awe; and as he appeared cheerful or dejected, the anxious votaries drew their presages; their breasts vibrated with corresponding emotions. Like the Dalai Lama of Thibet, or the King of Great Britain, whom a fiction of English law supposes never to die, the guardian fly of the well of St. Michael was believed to be exempted from the law of mortality. To the eye of ignorance he might sometimes appear dead, but, agreeably to the Druidic system, it was only a transmigration into a similar form, which made little alteration in the real identity." This English heir to the properties of Nergal and Baalzebub seems to have been consulted at least as late as the 1820's.

Two other of the more ancient civilizations might be mentioned before passing on to Greece and Rome. The Egyptians, with their highly developed system of medicine, considered worms rather than insects to be the instruments of disease. However, their land, traversed by a river which overflowed its banks annually, provided excellent breeding places for mosquitoes and must have been harassed by insect-born diseases. Therefore it is interesting to learn from Herodotus (10) concerning Egypt that "gnats are abundant; this is how the Egyptians protect themselves against them: those who dwell higher up than the marshy country are well served by the towers which they ascend to sleep, for the winds prevent the gnats from flying aloft; those living about the marshes have a different device, instead of the towers. Every man of them has a net, with which he catches fish by day, and for the night he sets it round the bed when he rests, then creeps under it and so sleeps. If he sleeps wrapped in a garment or cloth, the gnats bite through it; but through the net they do not even try at all to bite."

Finally we turn for a moment to the eastern wing of Indo-European civilization. The Hindus too evolved an elaborate system of medicine, as detailed in their medical text books, the *Vedas*. Upon one of the latter, the *Ayur Veda,* is based that most remarkable of the Brahmin texts, the *Susruta Samhita.* Tradition has it that this work is the account of a discourse by the holy sage Dhanvantari to his disciple Susruta. Bhishagratna (2) reports that this text was written at least as long ago as 800 B. C., a final recension being made by Nagarjuna in the second century B. C. Hindu physiology has an interesting bearing upon the Hippocratic doctrines which were evolved hundreds of years later. According to the Hindus, health was supposed to consist in a normal relationship between three primary humours—the air (below the navel), the bile (between the navel and the heart), and the phlegm (above the heart) (8). In this relation it is interesting to find the following note in the Journal of the Ceylon Branch of the British Medical Association for 1905, when the world of medicine was still ringing with the observations of Ross and other workers on the insect transmission of disease. The article is by Sir Henry Blake, Governor of Ceylon from 1903 to 1907, and entitled "Ancient Theories of

Causation of Fever by Mosquitoes"; the passages translated are from sections on the pathogenic insects (3).

In the course of inquiries into the causation of an epidemic of malarial fever in Mutwal, a division of the town of Colombo, last year, I received a report from fifteen members of the Sinhalese Medical Association, in which it was mentioned incidentally that according to ancient authorities on Ayurvedic medicine the chief causes of the disease are impure air and water and the existence of mosquitoes. I requested more precise information showing that mosquitoes were associated with the causation of malarial fever, and in reply I received extracts from ancient Indian works, among them an extract from Susruta, a Sanskrit work compiled, I am informed, from one of the lost Vedas. The age of the work is not known, but as it was referred to in the works of a contemporary of Kálidása, the great Sanskrit poet who flourished in the sixth century of the Christian era, the work is at least 1,400 years old.

The following are the passages. They are taken from the Sanskrit edition published in 1873, and will be found at pages 43 and 45 (Kalpasthanam):—

'KITA.

Life-destroying terrific twelve kinds:—

Tunginasa.	Mandalapuchchhaka.
Vichilaka.	Tunganabha.
Talaka.	Sarshapika.
Wahaka.	Avalguli.
Koshtagara.	Sambuka.
Krimikara.	Agnikita.

'Their bite is as painful as that of serpents, and causes diseases resulting from the three humors jointed together; the bite, as if burnt with caustic or fire, is red, yellow, white and pink colour, accompanied by fever, pain of limbs, hair standing on end, pain, vomiting, diarrhoea, thirst, heat, giddiness, yawning, shivering, hiccup, burning sensation,

intense cold, vesicles or pustules increasing, swelling, knots under the skin, circles, &c.'

'Masakah (Mosquitoes) are of five kinds:—

Samudra.	Krishna.
Parimandala.	Parwaytiya.
Hastimasaka.	

'Their bite causes swelling on the part bitten, itching. As for the parwatiya, it has similar qualities to life-taking insects.'

That the translation should be verified satisfactorily I invited five Sanskrit scholars of acknowledged authority to meet at Queen's House. The translation is that unanimously adopted by these five gentlemen, who have signed the extract.

These passages, written possibly three thousand, and at least fourteen hundred years ago, are of singular interest, foreshadowing as they do the great discoveries of Manson and Ross.

Truly there is no new thing under the sun.

The passage is certainly suggestive and concerning it Dr. Garrison says, "Witness the Susruta's very recognizable description of malarial fever, which is attributed to mosquitoes."

In this connection, Schröder's (24) quotation from Ernst Schultze's *Die Reisen des Venizianer's Marco Polo im 13 Jahrhundert* is of interest. The great medieval explorer, when visiting the Coromandel Coast of southern India, found the natives using mosquito nets, of which he gives the following description:

"Diese Leute haben eine Art Bettstelle oder Hütte aus sehr leichtem Rohrwerke. Letzteres is so kunstvoll zusammengefügt dass, wenn sie darauf ruhen oder schlafen wollen, sie die Vorhänge rings um sich dicht verschliessen können, indem sie an einer Schnur ziehen. Das tun sie, um sich vor den Taranteln sich zu schützen, die sehr schmerzhaft beissen, aber auch um Fliegen und andere Gewürme abzuhalten, während zu gleicher Zeit die Luft, die doch so nötig ist, die ungeheure Hitze zu mildern, nicht ausgeschlossen wird."

Turning now to the northern shores of the Mediterranean, we come to Greece, a country which, at least after the fifth century B. C. was ravaged by malaria. Low-lying Boeotia was particularly afflicted. Indeed, in the gradual enervation of the people by malaria Jones (13) sees the chief cause of the downfall of Greek civilization. As time wore on the word πυρετός took on a specific meaning. In the *Airs, Waters, and Places* of the Hippocratic writings we find many descriptions of malaria. The surprising thing is that despite the keen powers of observation characteristic of the Greek physician, and though "Athens was sadly plagued by mosquitoes and other insects, . . . and the Greeks knew that marshes were dangerous, they do not appear to have been in the least aware of the part played by the mosquito" (13). It seems to be impossible to identify anophelines as any of the insects described in Greek writings. The fact that Herodotus, as quoted above, thought the efforts of the Egyptians to avoid insects were exotic enough to be worthy of notice is perhaps a case in point. However, it is probably not difficult to explain the failure of the Greeks to suspect the part played by mosquitoes. To them disease was evidence of a discord in the humoral symphony, perhaps precipitated by some poison in the atmosphere. Though the patient might be treated by dietary measures, the source of his troubles was fundamentally an intrinsic one, and could not easily be related to so mundane a misfortune as a mosquito bite. The whole matter illustrates splendidly the truism concerning the barrier to scientific progress laid by preconceived, unproven theory.

If ever a people were provided with a first-hand opportunity to study the etiology of an insect-borne disease, the Romans were. Stretching for miles about Rome, particularly to the south, is a region of low-lying land, dotted with swamps and nearly devoid of trees, called the Campagna. How different the connotations *campagne* and *campagna*; the French word conjures up rolling sun-lit farm lands, the other dank, pestilential landscapes peopled by emaciated, enervated unfortunates as depicted in the paintings of Hebert and Maurice Sand. The Romans were fully aware of the danger lurking in the swamps. Even in pre-Republican days elaborate drainage systems were constructed (as the Greeks too had

sometimes done); and efforts along these lines have been continued up to the present day, when they are being particularly pressed. Whether as a result of these operations or no, during certain periods life on the Campagna was comparatively flourishing. The pre-Roman era, the Empire, the eighth and ninth, and the fifteenth to seventeenth centuries all saw an immigration into the Campagna, only to be followed by an exodus when malaria became epidemic, leaving in its wake deserted houses and uncultivated fields. The general opinion of the Romans cencerning the etiology of the disease may be best illustrated by the following writings by men of the period (5, 9).

Vitruvius (first century B. C.), Augustus' military engineer, stated that a city built among marshes but near the sea need fear little from the fevers; " for by means of sewers the waters may be discharged into the sea; and at those times when violently agitated by storms, the sea swells and runs up the sewers, it mixes with the waters of the marsh and prevents the generation of marshy insects " (Vitruvius I, 4, 11). This is certainly a creditable observation, and it is today a custom along our New England coast line to take advantage of a particularly high tide by allowing it to flood marshes that lie near the shore, thereby reducing the breeding of mosquitoes.

Columella (I, 4), the agriculturist of the first century A. D., relates that " a marsh always throws up noxious and poisonous steams during the heats, and breeds animals armed with mischievous stings, which fly upon us in exceeding thick swarms; as it also sends forth, from the mud and fermented dirt, envenomed pests of water snakes and serpents, deprived of the moisture they enjoyed in winter; whereby hidden diseases are often contracted, the causes of which even the physicians themselves cannot thoroughly understand."

And finally Palladius in his poem on agriculture (fourth century A. D.) says: "A marsh is by all means to be avoided, especially one lying to the east or west, and usually drying up in summer, because it engenders pestilence and harmful animals." The Roman satirists, Horace and Juvenal, write of the summer and autumn dangers of the Campagna, and refer to the use of the *coponeum*, or mosquito-net. It is also related that the Romans would examine

the livers of the animal inhabitants near a projected site of a habitation for pathological changes.

To quote Dr. Garrison (9) again, "These extracts show that from the second century B. C. to the fourth century A. D. and after, the Romans had a clear notion of the relation between the fauna of marshes and malarial fever." It does not appear that there was any real certainty as to whether the insects caused the disease or whether they were merely concomitant with the presence of swamp vapors and gases which were the actual etiological agents. If the insects themselves brought the disease, were the symptoms dependent upon the actual entrance of the animal into the body, or was inoculation effected simply by a sting? These are points which are unanswered. But the Romans made the best use of what knowledge they had; they avoided marshes when possible and drained them when necessary; they regarded the presence of insects as unhealthy and took steps to prevent their breeding. We of the twentieth century have added little to these basic principles of anti-malarial hygiene.

From these Romans of the early Christian era our cursory survey takes us forward fifteen hundred years to one of their fellow countrymen of the eighteenth century. This step is perhaps not so precipitous an advance as it first appears. European medicine labored most of this period under its bondage of Galenic tradition. Humoral medicine held sway, and, as explained before, it was not a system conducive to research into the true cause of disease. There was required the influence of a Vesalius and a Harvey to instill a new element into the physician's viewpoint. Meanwhile, there was little to bridge this gap in our story. One hears that during the Middle Ages the Moors of southern Spain, before constructing a hospital, were accustomed to place pieces of meat at various desirable sites for the projected building. The piece of flesh which attracted the fewest flies marked the healthiest location for the hospital. This practice is merely a further illustration of the age-old correlation between the presence of insects and disease. Another report of interest is that of Celli (5) to the effect that the Pope Innocent III (1198-1216) died from the malaria which ever continued to plague Rome. Just before his illness he is supposed to

have complained of the mosquitoes which perhaps the sirocco had carried from the Campagna to his palace.

The observant Ambroise Paré in his *Apologie et Traité contenant les Voyages Faits en Divers Lieux* (1585), tells of his visit to the battlefield of St. Quentin (1557). As translated by Packard (20), " We saw more than a half a league about us the earth all covered with dead bodies; and we could scarcely remain there because of the great cadaverous stench which raised itself from the bodies as much of men as of the horses, and I believe that we were the cause of making rise up from these bodies a great number of big flies which had procreated themselves from the humidity of the dead bodies and the heat of the sun, having their tails green and blue, that being in the air they made a shadow in the sun. We heard them buzzing with great wonder; and I believe that there where they settled it would render the air pestilent and cause the plague." Dr. Howard Kelly (14) comments on the passage, " The value and completeness of the observation of this great surgeon is fully appreciated when we consider how short a step it is necessary to take in order to make a practical application in the prevention of the infection thus distributed by flies, whether by inhumation or incineration of the dead bodies or by the use of screens to protect the living."

One must also make mention of Athanasius Kircher (1602-1680) and Francesco Redi (1626-1694). The first of these, a Jesuit priest of Austria, lent a vital element to Fracastorius' doctrine of contagion. With the aid of the newly-invented microscope he observed the development of maggots in decaying matter and supposed these " worms " to be a general cause of disease. The Italian naturalist Redi disproved the popular theory of spontaneous generation when he showed that in meat protected from flies by wire gauze, maggots would not appear; whereas if the insects were allowed to alight on the flesh, they laid eggs which eventually hatched.

The introduction of quinine into Europe in 1640, together with the increased activity in the field of science as a whole, must have stirred the physicians in regions infected by malaria to ponder over the manner of transmission of the disease. At any rate, there appeared in 1717 a treatise most important in the history of insect-borne disease—the *de Noxiis Paludum Effluviis eorumque Remediis* of Giovanni Maria Lancisi (9, 11).

The man was born in Rome in 1654 and died in 1720. Deserting theology for medicine, he reached the peak of the latter profession. He became professor of Anatomy at the Collegio della Sapienza, where he is supposed to have come into contact with Malpighi. In his busy life he found time to perform the duties of physician to the Popes Innocent XI, Innocent XII, and Clement XI. (From the last of the three he received the superb unpublished plates of the *Tabulae anatomicae* of his predecessor by more than one hundred years at the Collegio, Eustachius (1524-1574). These Lancisi had printed in 1714). Morgagni received encouragement from Lancisi in the preparation of his *De sedibus*. " Er gehört zu den verdienstvollsten italienischen Praktikern; die Anatomie, praktische Medicin und Hygiene verdanken ihm erhebliche Bereicherungen." (11). Dr. Garrison points out his good account of aneurysms and their etiology, and credits him with the first descriptions of cardiac vegetations. However, it is as an epidemiologist that Lancisi particularly excelled. Epidemics of influenza and of cattle-plague drew his attention, but in malaria he found his forte. The interesting thing is that much of his *De noxiis paludum effluviis* is suggestive of the older Roman authors already quoted. Indeed, it was Lancisi who unearthed and brought to the general attention the opinions of Vitruvius, Columella, Palladius and others on marshy fevers. Probably in many respects Lancisi was not more advanced in his views than they; but he does take more particular notice of the mosquitoes which plagued the Campagna. " Sed potissimum molestum illud chrysalidum genus, quod venit sub culicum nomine." Perhaps it would not be amiss to quote further a few of Lancisi's paragraphs in the *De noxiis* etc. as translated by Gorgas and Garrison. Interest is lent to the third paragraph if for " worm " one reads " parasite."

> Cap. XVII., III. (p. 61): In a previous chapter, I have shown that mosquitoes (Culices) and other insects make their nests on the water during summer. It can therefore be easily seen that near swamps, where there are so many kinds of organisms and whence their multitudes are thrown into the surrounding air, the water, which the inhabitants use for drinking, is infected with these organisms.
>
> Cap. XVIII., IX. (p. 66): Furthermore, no controversy

> can surely arise among professional men concerning the harmful effect which the insects of the swamps inflict upon us by mixing their noxious juices with their saliva and gastro-intestinal fluids. For, as I have shown above at length, their proboscis is always wet, and, as all their viscera are full of deleterious liquids, it is not possible that the juices rolling down with food and liquids into the stomach, are not there mixed with our ferments. . . . For this reason, we may conclude that marshy insects are highly injurious to the body of man by the inmixture of deadly juices as well as by the withdrawal of the useful ones which are in us.
>
> Cap. XIX., III. (p. 72): Moreover, I take the rôle of a seer and not of a philosopher if I, without experiments, venture to affirm that, in camp fevers of this sort, the worms penetrate and ascend the blood vessels. For it would be necessary that the blood of those suffering from marsh fevers should be let, which medical reason seldom admits; and to carefully examine the blood with a microscope for insects of this kind, if such there be. But, although worms might be seen in the drawn blood, it would still be doubtful that these insects should be considered as the cause of the evil; or whether, which I consider more probably, it is the product of the breaking down of the fluids; whence all the minute ovules, after they have been wrapped up in particles of the blood, are set free or are supplied from the external air. I can therefore form no opinion from autopsies whether these diseases are carried by insects into the blood.

That Lancisi was not entirely won over from the doctrine of miasms or effluvia, the age-old hypothesis to the effect that fever was introduced into the body by the inhalation of noxious swampy vapors, the following line bears witness: "An inter animata paludum effluvia sint aliqua ceteris minutiora, quae intra sanguina vasa deterius multiplicanda ferantur; et quae fit verae pestis, ac pestilentium morborum differentia." But one suspects that had he lived one hundred and fifty years later he would have been quick to put his mosquito theory to the experimental test which alone could have proved his point.

The slim thread of our story now leads us on some eighty years to 1796, when there settled in the town of Baltimore, Maryland, after a somewhat peripatetic career, one John Crawford (6, 22) The subject of discussion for the next few pages was born in northern Ireland probably in the early 1740's. Educated at Trinity College, Dublin, young Crawford studied medicine, and subsequently found employment as surgeon on the ships of the East India Company, making several voyages. Marriage in 1778 put somewhat of a crimp in his wanderings, and he became Physician to the Hospital at Barbados; unhappily Mrs. Crawford died after four years. Crawford then served the Dutch Government as Physician-General to the colony of Demerera (now British Guiana). The cession of the colony to England in 1796 left Crawford unengaged. His brother-in-law, John O'Donnell, a wealthy Irish-American merchant of Baltimore whose estate of " Canton " was a noted one, enticed him to America. To quote Dr. Hall Pleasants (22) concerning Crawford, " He at once identified himself actively with the medical, civic, literary, religious, philanthropic and masonic activities of the City. We soon find him Chairman of " The Medical Faculty of Baltimore," Vice-President of the Medical Society of Baltimore, Consulting Physician to the Board of Health and City Hospital, and a member of the Medical and Chirurgical Faculty of Maryland. He was largely responsible for the founding of the Baltimore General Dispensary, and for the establishment of the Maryland Penitentiary. . . . Dr. Crawford is said to have been attractive personally, a warm-hearted friend and a delightful conversationalist."

Crawford's varied experience evidently well qualified him for a place at the head of the local medical profession. Dr. Welch characterized him as " doubtless the best trained, most original, and experienced physician of his day in Baltimore." In his practice in the tropics he must have observed disease in its most diverse forms and have realized the incompetence of the current theories dealing with it. He was quick to grasp at new therapeutic means. In the summer of 1800 we find that John Ring sent to Crawford from England a sample of vaccine virus " on cotton thread, rolled up in paper, and covered with a varnish which excluded air." (John Ring, *Treatise on the Cow Pox, 1801*). Whether Crawford was success-

ful in his use of the vaccine is doubtful, and there is little substantial evidence on the side of those who claim for him the credit of antedating in its application Waterhouse of Cambridge, who successfully vaccinated his own son in July, 1800.

Crawford is of particular interest to us because of his belief that a theory of the animate contagion of disease best explained the phenomena of epidemics. This opinion was regarded as ridiculous by his confrères, and it is related that for this reason his principle essay on the subject appeared not in a medical journal but in a local *literary* magazine, the short-lived *Observer* financed by Crawford in order that its editress, his talented daughter Eliza, should have " some useful employment." The full title of this diminutive weekly was " The Observer and repertory of original and selected essays in verse and prose, on topics of polite literature." Only one copy is known still to exist; it is in the library of the Maryland Historical Society. It ran for the year of 1807 only, for in 1808 Eliza found what she evidently considered more useful employment as the wife of Maximilian Godefroi, the distinguished French architect who designed the Battle Monument, the Unitarian Church opposite Number One West Franklin Street, and St. Mary's Chapel on Paca Street.

Crawford, whose *Remarks on Quarantine* ran for several months in the *Observer* (7), is at some pains to justify his essay as " polite literature." He writes, " It is of the highest importance that the community at large should be made acquainted with what is so materially the concern of every individual, and it cannot fail to be highly advantageous, both to the physician and to the patient, to be united in their opinion as to the cause of disease " (Vol. 2, p. 183). He is quick to explain that he regards disease as a very necessary preventative against over-population, quoting Malthus and others on the horrors which might otherwise follow. That we are so ignorant as to the cause of sickness is but a kindness on the part of God. " We are not made insensible of epidemic origin to render us incapable of obviating its effects, but in mercy to deliver us from the horrors of its approach and assault." (Vol. 2, p. 249). To another less keen these thoughts would probably have appeared good excuse for avoiding even the mental effort of conjecture on this important

medical topic. Not so Crawford, for he continues, "As then premature death, and epidemics as a mean of procuring it, are indispensably necessary to the conservation of human existence, our sole object should be to exert every power of the mind to alleviate, not vainly to attempt obviating, so necessary an evil." (Vol. 2, p. 250).

As already related, the papers in the *Observer* are "Remarks on Quarantine." It had not appeared to Crawford in his readings and his own observations in the East and West Indies and subsequently in Baltimore that the benefits from quarantine, so rigidly enforced in Europe, were at all worthy of the personal and financial inconveniences it occasioned. He cites the epidemics of yellow fever which occurred in Baltimore in 1797 and 1800. The disease was accustomed to break out in that low-lying part of the town to the east of Jones Falls known as Fell's Point. Thence it would proceed into the "Town" proper and work its way north, its intensity lessening until the higher ground in the northwestern suburbs was reached, into which it did not trespass. This phenomenon, easily explainable by us of today who can see in the unhealthy environs of Jones Falls an excellent breeding ground for mosquitoes, militated in Crawford's mind against the efficacy of quarantine. The disease seemed to be self-limited to the parts of the town nearest the harbor, regardless of the existence or absence of quarantine regulations. "It has already been well ascertained that no epidemic can depend upon any contagion communicated from person to person, and also in the yellow fever, that in no instance has the disease ever been communicated in that way" (Vol. 2, p. 69).

It occurs to the reader of the *Observer* that whenever Eliza Crawford ran short of copy for her magazine, she ran to her father and asked him for "something more about that old quarantine business." After the first few chapters on quarantine, Crawford proceeded to discuss his theory of animate contagion in a most haphazard manner. His method was to draw analogies between the pathology of the animal, and particularly the insect world, and the pathology of the diseases of man. Issue after issue of the *Observer* contains interesting but hardly relevant accounts of the vicissitudes of insect life. The example of the ichneumon fly is particularly

emphasized, and Crawford relates at some length how the adult lays its eggs (i. e., the seeds of disease) in the body of its insect victim, which is destroyed when the eggs are hatched. "If this reasoning is just, it of necessity follows that as the plague of the caterpillars, pucerons, and of all the insect tribes, is the ichneumon, which deposits its eggs in their bodies or in places near to which they abide, which when hatched, prey upon them, either wholly at once or by parts . . . , so the plague, yellow and every other fever and every other disease we experience, must be occasioned by eggs insinuated, without our knowledge, into our bodies" (Vol. 2, p. 50). And in the same vein, "Hence the suggestion becomes more reasonable that our diseases originate in the same cause: That we are exposed to assaults similar to what the caterpillars experience, and that we are in like manner destroyed by worms which proceed from the eggs deposited in different parts of our bodies" (Vol. 2, p. 326). Crawford was quite *au courant* with the animalcular theories of Kircher and Swammerdam, and may have been the first to champion them in America. But he was before his time. "From these considerations, and the suggestion already urged, that no kind of air has ever been known to induce fever of any description, no species of gas, or variety of aerial vapour can be assigned as a cause of epidemics, or a medium of contagion" (Vol. 1, p. 286). To quote a proponent of the miasm theory (and who was not in 1807?) this was merely "the wildest of philosophical vagaries."

John Crawford continued to live in Baltimore with his daughter and son-in-law at a house on the corner of Hanover and German Streets; although he wrote but little, he continued in active practice until his death in 1813. In 1819 the Godefrois went to France, where Eliza, the second woman in America to fill an editorial chair (22), died in 1839.

Southward we go now to Columbia, South Carolina, where there was born in 1804 one Josiah Clark Nott (1, 15). His father came originally from Connecticut, was educated at Yale College, and later moved to the south. Young Nott took his A. B. at South Carolina College and subsequently studied medicine at the College of Physicians and Surgeons in New York and at the University of Pennsylvania. By 1829 he was practicing in Columbia, but in 1835 went

to Paris for two years, where he not only pursued his medical studies but showed an interest in broader aspects of natural history. The latter part of 1836 saw Nott settled in the States again, this time at Mobile, Alabama, where during the course of the next twenty years he won a place at the head of the Alabama medical profession. In 1857 he became Professor of Anatomy at the University of Louisiana, but after a year he relinguished the Chair to found and lecture on surgery at the Medical School in Mobile, an institution made possible chiefly by public subscription. The Civil War snuffed out Nott's new school and we find him serving on the Confederate Medical Staff. Soon after the close of hostilities Nott went to Baltimore and practiced a year there, finally moving on to New York where he became prominent as an able surgical gynecologist. In 1872 ill health caused his return to Mobile, where he died in 1873, much lamented by the many to whom his personality had endeared him. Kelly and Burrage (15) comment that "he was an untiring student and indefatigable worker, ever ready in public or private to advance science." Besides his numerous medical papers on divers subjects, his interest in ethnology which he whetted during his stay at Paris led to the writing of four books on the subject. Two were on Biblical peoples, and two more, published in collaboration with G. R. Gliddon, were entitled *Types of Mankind* (1854) and *Indigenous Races of the Earth* (1857). Nott refuted the orthodox theory of the common origin of human races. If, as was then supposed, man's advent upon the earth was only 6000 years ago, he queried, how in the short time since could a single group have spread so widely throughout the world and become so different in so many ways? The world must actualy have been peopled from several distinct centers. One can easily picture Nott's interest when, in 1859, the *Origin of Species* appeared, and we read that he was quick to recognize the truth of the principles which Darwin set forth, irreconcilable though they were with the ethnological system on which his own work had been based.

Nott seems to have had in him a suggestion of what Professor Castiglioni of Padua, in speaking of the varied interests of the famous figures of the Italian Renaissance, calls the "universal man" (4). For his paper which particularly interests us and which ap-

peared in the *New Orleans Medical and Surgical Journal* for March, 1848, treats neither anatomy, surgery, gynecology, nor anthropology (18). Its full title is " Yellow Fever contrasted with Bilious Fever—Reasons for believing it a disease sui generis—Its mode of Progagation—Remote Cause—Probable insect or animalcular origin, etc."

The essay is as rambling as its title, but none the less entertaining. Nott makes two principle points. The first is an answer to a paper by Chervin in 1842 which upheld " l'identité de nature des Fièvres d'origine paludéenne de differents types." Nott, after consideration of the symptomatology and epidemiology of yellow fever and bilious or intermittent fever, as malaria was called, concludes that the two are quite distinct diseases. After commenting on the tendency of intermittent fever to " haunt the victim for life," he writes (p. 583), " How different is it with Yellow Fever? Like Roderick Dhu, it scorns all unfair advantage and nobly " tries the quarrel hilt to hilt," and when the " dubious strife " is over, if his antagonist has proved the victor, he may " falter thanks to heaven for life redeemed " and rise unmolested by the " *foeman's clan* " !

Nott's principal thesis is one partly inspired by Sir Henry Holland's essay " On the Hypothesis of Animalcule Life as a Cause of Disease " ; this latter appeared in 1839 in the popular *Medical Notes and Reflections* of this prominent London doctor who was honored as Physician in Ordinary to Queen Victoria. Of Holland's essay suffice it to say that it was vague and probably did little more than voice a now quite general dissatisfaction with the age-old miasm theory. (He was able subsequently in the third edition (12) to offer as further evidence certain observations on the cholera epidemic which passed from India through the rest of the world during the first half of the nineteenth century). Josiah Nott, in turn, applies the animalcular theory of disease transmission to yellow fever. Like Crawford, like Holland, his use of the term " animalcular " is a very broad one; now it denotes an invisible living organism, and in the next sentence it may be the more tangible fly or mosquito. Also like Crawford, Nott had first-hand experience in observing the disease in the course of five epidemics that prevailed in Mobile from 1837 to 1844 and during which he en-

deared himself to the people of the town by his unstinted efforts on their behalf. In retrospect he first attempts to apply the "malarial" or miasm theory to his epidemiological observations. He quotes Macculloch, as the "*ipse agmen* of the Malaria party," "whatever malaria may be in its simple state, it is only as united to the atmosphere that we know it, and we must therefore view it as an aeriform fluid, as far as the question of its propagation is concerned. It must be considered as the very atmosphere itself, when it exists; and its propagation therefore must be primarily regulated by those laws which govern the motions of currents of air" (p. 564). The spread of yellow fever Nott found, however, to show a signal independence of the direction of the wind; rather "it travelled from house to house for more than a month, as would a tax collector, and was just about as much influenced by the weather" (p. 564). He concludes from these and other observations that "the morbific cause of Yellow Fever is not amenable to any of the laws of gases, vapor, emanations, etc., but has an inherent power of propagation, independent of the motions of the atmosphere, and which accords in many respects with the peculiar habits and instincts of Insects" (p. 565).

Other passages are of equal interest. Concerning the contention that the morbific miasm is generated by decomposing matter, and the fact observed by him that a frost at the end of a summer puts an end to yellow fever, Nott writes "We often have two or three weeks of weather after a killing frost, as warm as that which preceded it, and there is no reason why the decomposition should not resume its operations; but not so with the Yellow Fever—like in insect life, when the ova are once hatched, the propagation of this disease goes on till arrested by a *killing frost*—and it can only be animated by another summer's sun, which calls from their slumbering places the various insect tribes" (p. 572). "All the attempts heretofore made to account for the greater activity of the morbific cause of Yellow Fever at night have failed and in my humble opinion the fact may be much better explained by a reference to habits of Insect Life. Many of the Infusoria, as well as insects proper, are rendered inactive by too much light, heat or dryness. They remain quiet through the day, and do their work at night. The fact

is too familiar to require illustration. The moth tribe, the night musquitoes, many of the Aphides, etc., are familiar examples" (p. 581).

Concerning the somewhat involved attempts by proponents of the miasmal theory to explain the contraction of fevers at points elevated above the unhealthy marshes, Nott comments, "It would certainly be quite as philosophical (as the Malarial Theory) to suppose that some insect or animalcule, hatched in the lowlands, like the musquito, after passing through its metamorphoses, takes flight, and either from preference for a different atmosphere, or impelled by one of those extraordinary instincts which many are known to possess, wings its way to the hill top to fulfill its appointed destiny" (p. 580). And finally, "Though my argument is intended particularly to illustrate Yellow Fever, which I regard as a disease *sui generis,* still I may be permitted to remark that the present state of facts do not warrant us in assuming identity for all the other forms of what are termed Marsh Fevers, viz. Intermittent, Remittent, Bilious and Congestive Fevers. . . . I am by no means sure that all these types may not be most rationally explained by attributing them to various insect species, but laying aside this hypothesis and assuming the *malarial,* it would be a strange anomaly in nature, should it be proven that but one morbific cause of fever is generated over the broad surface of our variously compounded globe.—Fever should have its genus and its *species,* like other things in nature" (p. 569).

Dr. Arnold Klebs speaks in scathing terms of the medical historians who in their writings pick out this or that sentence of such and such an ancient who happens to express some theory which modern authors subscribe to, and comment "What an intelligent man he must have been! See, he thinks just as we do about it." In so doing these writers set modern science on a pedestal and in a self-centered way use it as a yardstick to measure past achievements, failing to consider the conditions extant in other times. I trust that in these pages I have not been committing that very sin. This has certainly not been a full history of insect contagion. A man here and there has merely been singled out, biographical notes made, and his work sketchily reviewed. That work must be considered

in the light of his times. "How foolish of Lancisi not to attempt the *experimental* transmission of malaria by a mosquito! How dull of Josiah Nott that he failed to try the effect of careful screening of houses upon the spread of yellow fever in Mobile!" Not at all; the Spallanzanis of the eighteenth century were few and far between; and the *Introduction à la médecine expérimentale* was a product of the 1860's. The experimental method was not generally available (for biologists in particular) before the latter part of the last century. How then could men proceed? First, by careful *observation* of what went on in Nature; and secondly, by drawing *analogies* whenever they might be helpful. And both these methods were pursued. Often one might be prejudiced in or misconstrue one's observations, but that was inevitable. In the *Remarks on Quarantine* how well are both these methods illustrated. For the first, there is the careful *observation* of the manner of spread of the yellow fever along the waterfront of Baltimore, and the comparative infrequency of the disease in the higher portions of the town to the northwest. By a comprehensive *analogy* with the fight for life among the lower animals, Crawford then comes to the conclusion that disease in human beings is a similar animate conflict.

Thus we have seen that by 1850 insects were accepted by some as carriers of disease. But through the ages, and particularly in these works of the eighteenth and early nineteenth centuries, one can read (or does one read into them?) an inarticulate feeling that there existed a mysterious gap in biology which must be bridged before a real understanding of contagion could be achieved. What of the "deleterious liquids" which Lancisi described the malarial mosquito as inoculating into his victim? Surely the "eggs insinuated, without our knowledge, into our bodies" (Crawford) were to hatch no common larvae? Langenbeck and Schoenlein and Davaine were pointing the way towards the solution. Lancisi's problem Laveran finally solved in 1880. And yellow fever? To answer that question and all that it connotes is the task to which bacteriology sets itself today.

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For an account of insect contagion 1850-1899 see: G. H. F. Nuttal, in "Hygienische Rundschau." (1899) *9*.

SPONTANEOUS COMBUSTION—A LITERARY CURIOSITY [1]

JOHN RATHBONE OLIVER

In the literature of every country, there is usually one writer who stands out as a writer of tales of horror. In English literature, one naturally thinks of Edgar Allen Poe, in German literature, of Hans Heinz Evers and his famous book of stories, " Das Grauen."

The type of horror story has varied. In early Victorian times, it was a dull story of dark caverns and prison cells and ghosts and rattling chains. Poe created another type, which really did induce a feeling of horror, even though Poe used the old machinery of prisons and burial vaults and the creaking of the iron doors of tombs.

There is another master of horror, who is seldom classified as such. Those who have studied Charles Dickens from this standpoint will find, I think, that he has an ability to create a horror atmosphere and to maintain it, as well as Poe and Evers and the whole group. I think there is nothing more terrifying than the first chapters of " Great Expectations " and especially the thread of Lady Dedlock's secret that runs through " Bleak House." But the chief horror scene in " Bleak House " was achieved at the cost of much contemporary criticism. Critics said that Dickens was creating his effects by describing incidents that had never happened and never could happen.

You will remember that in " Bleak House " (vol. II, chap. 1), nearby the Courts of Chancery, Dickens describes a strange little house, in which Lady Dedlock's former lover was found dead from an overdose of opium and which was the property of the peculiar, wizened, little old man who was nicknamed the Lord Chancellor, who never threw anything away and who allowed old papers, old bottles, old bones to accumulate day by day in his strange dwelling. He drank about a quart of gin a day or more. There is a remark-

[1] Read before the 12th annual meeting of the American Association of the History of Medicine, Hotel Haddon Hall, Atlantic City, N. J., Monday, May 4, 1936, at the afternoon session.

ably able description of this old man when he is roused from an alcoholic slumber about three in the afternoon by Mr. Guppy and promises that that same evening he will turn over to Mr. Weevle some letters that Guppy has been trying to get—letters which connect Miss Summerson, with whom he is in love, with the great and rich Lady Dedlock. Mr. Weevle and his friend Guppy are sitting upstairs in the Lord Chancellor's house waiting for the appointed hour when the letters are to be handed over. They know that the old Lord Chancellor, having consumed another pint of gin with his supper, is sitting in front of his fire downstairs dozing. Upstairs, gradually the room, in which the two young men are sitting, seems to be filled with a particularly fetid odor. From the ceiling, there falls a disgusting kind of slimy soot, which sticks to everything and which cannot easily be removed from the hands or hair. There is a curious effluvium that passes through the house and that settles on everything. The two friends can scarcely breathe. At last, they hurry downstairs at the hour appointed by the old man and they find his room apparently empty. As they bring a light and come nearer the fire, they recoil in horror, for there in front of the fire is nothing but a pool of this fetid soot, oily, stinking, in which there float a few bones, a hand and a foot.

"Where is he?" says one of the young men.

"God forgive me!" says the other. "He is here." (See Fig. 1).

As I have said, Dickens was criticized for removing one of his characters by means of what was called spontaneous combustion. Criticism was so severe that in Dickens' preface to "Bleak House," which he wrote after the last serial chapters had appeared, he asserted the possibility of spontaneous combustion and cited a number of cases of that mode of death.

Emile Zola in one of his novels makes use of the same thing. In his "Nana," I think, he describes an old peasant, who is a confirmed alcoholic and who one evening is sitting in front of his fire smoking his pipe. He falls asleep; the pipe drops on his leg and burns a small hole in his trousers. This is sufficient to start the spontaneous combustion and the man is soon reduced to a heap of ashes. Zola, however, is not the horror painter that Dickens was.

It has proved interesting to trace this whole question of spon-

Fig. 1

taneous combustion. During the nineteenth century, it was a more or less accepted fact of pathology and legal medicine. There is a long article on *combustions humaines spontanées* in the sixth volume of the *Dictionnaire des Sciences Médicales,* published in 1813.

I have discovered also one old dissertation and one French and one German book on spontaneous combustion, running between 1757 and 1805. The dissertation was written and printed in Leyden and represents the attitude of Dutch science at that time (see Fig. 2). The other two books represent equally the opinions of France (see Fig. 3) and of Germany (see Fig. 4). In each work, definite cases are cited and, then, certain principles are deduced from them.

In " Bleak House " the description of the death of old man Krook is associated with four phenomena (" Bleak House," Vol. II, Chapter 1, pp. 11-15)—first, a thick, yellow, stinking liquor or fluid, which comes from the air and drops from the ceiling, second, an oil-like substance, third, a soot that falls also through the air and smears everything it touches like a black fat, fourth, in the neighborhood of where the body once was, there are found cinders of small, charred bones, sprinkled with white ashes. All these four phenomena are repulsive because of their appalling odor.

Dickens refers to the case of the Countess Cornelia Bandi, which was quoted by a distinguished prelate, Bianchini of Verona. Dickens cites also the sixth volume of *Philosophical Transactions*—a work which was so imperfectly cited that I was unable to consult it. He also mentions " a book on medical jurisprudence not entirely unknown." Finally, he gives the names of three French scientists —Foderé and Mêre, also Monsieur Le Cât.

Le Cât was a famous French surgeon, born in 1700 and dying in 1768. The article on spontaneous combustion was apparently published after his death. I have been unable to discover a copy of it.

The three treatises in my own possession, which are to be found in the Surgeon General's Library in Washington, contain a number of definite cases of spontaneous combustion. On page 13 of the little essay of Pierre-Aimé Lair (" Essai sur les combustions humaines produits par un long abus des liqueures spiritueuses," 2nd ed., 94 pp. 12°, Caen, F. Poisson, 1823), the case of the Countess

SPECIMEN PATHOLOGICO-MEDICUM
INAUGURALE
DE

INCENDIIS CORPORIS HUMANI SPONTANEIS.

QUOD,

FAVENTE SUMMO NUMINE,

Ex Auctoritate MAGNIFICI RECTORIS

D. DAVIDIS VAN ROYEN,
MEDICINAE DOCTORIS. BOTANICES IN ACAD. LUGD. BAT. PROFESSORIS ORDINARII:

NEC NON

Ampliſſimi SENATUS ACADEMICI *Conſenſu*,
& Nobiliſſimae FACULTATIS MEDICAE *Decreto*,

PRO GRADU DOCTORATUS,

Summisque in MEDICINA Honoribus & Privilegiis
ritè ac legitimè conſequendis,

Eruditorum Examini ſubmittit

IONAS DUPONT,
AMST. BAT.

Ad diem 16. *Decembris* M. D. CC. LXIII. *H. L. Q. S.*

Intima pars homini vero flagravit ad oſſa:
Flagravit ſtomacho flamma, ut fornacibus intus.
LUCRET.

LUGDUNI BATAVORUM,
Apud THEODORUM HAAK, Bibliop.

FIG. 2

ESSAI

SUR

LES COMBUSTIONS

HUMAINES,

PRODUITES PAR UN LONG ABUS DES LIQUEURS SPIRITUEUSES ;

PAR PIERRE-AIME LAIR,

MEMBRE DE L'ACADÉMIE ROYALE DES SCIENCES ARTS ET BELLES-LETTRES DE CAEN.

DEUXIÈME ÉDITION.

CAEN,

DE L'IMPRIMERIE DE F. POISSON.

1823.

FIG. 3

Ausführliche
Darstellung und Untersuchung
der

Selbstverbrennungen

des
menschlichen Körpers,
in
gerichtlich - medizinischer und pathologischer
Hinsicht.

Von

Johann Heinrich Kopp,

der Arzneikunst und Wundarzneikunst Doktor, praktischem Arzte und Professor der Chemie, Physik und Naturgeschichte zu Hanau, ständigem Sekretär der wetteranischen Gesellschaft für die gesammte Naturkunde, auswärtigem Mitgliede der Gesellschaft naturforschender Freunde zu Berlin, Ehrenmitgliede der Gesellschaft korrespondirender Aerzte und Wundärzte zu Zürich, der botanischen Gesellschaft zu Regensburg, der Gesellschaft korrespondirender Pharmazeuten und des Museums zu Frankfurt am Main, der Société médicale d'émulation zu Paris, der physisch - medizinischen Gesellschaft zu Erlangen und der mineralogischen Sozietät zu Jena Korrespondenten.

Frankfurt am Main, 1811.
Bei Johann Christian Hermann.

Fig. 4

Bandi is mentioned. Lair quotes it from an English journal, the Annual Register of 1763.

"The Countess Cornelia Bandi, and inhabitant of the city of Cesene, sixty-two years old, enjoyed good health. One evening she felt a sort of weakness and went early to bed. Her maid stayed with her until she was asleep. Next day when this maid entered the room in order to wake her up, she found nothing but a corpse in the most hideous condition. Four feet from the bed was a little pile of ashes in which one distinguishes two intact legs, together with the arms. Between the legs was the head of this lady, whose brain together with part of the anterior portion of the skull and the entire chin had been completely consumed. They found three fingers turned to coal; the rest of the body was reduced to ashes, which, when touched, left on the hand a damp residium, fatty and fetid. A little lamp that had been placed on the floor was covered with cinders and was empty of oil. The two candles on the table had been melted, but the wick had not been touched by fire at all. The bed did not seem to be harmed. The sheets and blankets had been lifted up and thrown to one side as they are when a person jumps out of bed. The furniture and curtains were covered with a kind of soot that was damp and the color of ashes. It had penetrated even into the bureau drawers and had soiled the linen there. This soot, having passed into the neighboring room, attached itself to the walls and to the kitchen utensils. A piece of bread that had been put away in a drawer was covered with it and not even a hungry dog would touch the bread. A vile odor had communicated itself to other apartments. The English journal, in which this case appears, observed that every night the Countess was accustomed to bathe all her body with camphorated spirits of wine."

The Annual Register, in the same article, cites two other examples of this type of death. In another volume of the same journal (1775, vol. 18, p. 78), Mr. Wilmer, a surgeon, communicates a similar case of one Marie Clews, fifty years old, who had been for years a pronounced alcoholic.

A much more scientific and thorough treatise on the subject is the little book by Joannes Henricus Kopp ("Ausführliche Darstellung und Untersuchung der Selbstverbrennungen des Menschlichen

Körpers in gerichtlich medizinischer und pathologischer Hinsicht," 84 pp. 8°, Frankfurt, a. M., J. C., Heiman, 1811). He cites some eighteen cases. Of these, the last three or four were personally known to him. On the basis of this material, he denies Lair's statement that only women are subject to spontaneous combustion. Kopp says on page 55 that the following principles may be accepted as established. Women are indeed most subject to such a death, but there are cases in which men died in the same way. All these people, male and female, are over sixty. There are no cases of young people. Almost all the cases known suffered from some lowering of vitality, which was the result of either their advanced age or of some definite illness. These patients lived a life of inactivity, which increased their weakness. Many of them were fat and asthenic. Most of the patients, also, were extreme alcoholics. Generally, but not always, fire, light, or burning coals were found in the neighborhood of the place in which the death by combustion took place. The burning began with great quickness and soon covered the whole body, so that as a usual thing the patient could not call anyone to help him. The flame could only with difficulty be put out with water, and did not harm the environment, except when it was in close connection with the burning body. The place where the burning happened was always filled with a distressing smell. The walls, the rest of the ashes and coals were covered with stinking wetness and fat. The chest and the abdomen were always consumed by the fire, except for a few bones. Of the head and the extremities somewhat more remained. These deaths seemed to have occurred generally in winter and especially in the depth of winter. The people who have described these various cases are almost all men of scientific attainment, such as Vicq-d'Azyr, Thomas Bartholinus and Le Cât.

Le Cât in a medical note " Sur les incendies spontanés " (quoted by Kopp) cites several cases that had come to his own knowledge. He mentions also that in 1724, he lived in Rheims in the house of a certain Millet. The wife of this man drank herself unconscious every day and Millet had to turn over the care of the house to a young girl who happened to be very pretty. In February of 1725, they found Millet's wife in the kitchen, a foot and a half from the

hearth, and burned up. Only parts of the head and of the lower extremities and a few of the lower vertebrae had escaped from the power of the fire. The floor beneath the body was burned to an extent of a few inches. A wooden bread trough and a salt box that stood very near the body were untouched. What was left of the body was examined by the legal authorities. Millet testified that on the night of his wife's death, he had gone to bed with her. She, however, could not sleep, got up and went into the kitchen. He, thinking that she was more comfortable in the kitchen, went back to bed. At two o'clock, he was awakened by an appalling, stinking smell. At his entrance into the kitchen, he found his wife's body as he had described it. The legal authorities were ignorant of deaths of this kind and on account of the good-looking girl who took care of Millet's house, suspicions were aroused. Millet was arrested for having got rid of his wife in order to marry the girl and was condemned to death. Finally, the sentence was reversed, but Millet's life had been ruined. He had lost all his money and was embittered. He died shortly afterwards in a hospital.

Kopp in his case histories includes all those given in the work of Lair. As for the causation of the burning, Kopp believes that the fire is started by an electric spark similar to those that sometimes appear in cold weather when the hand has been rubbed in fur. He mentions various electric peculiarities among animals, especially fish.

He also calls attention to one particular point. He says that when criminals or witches were burned at the stake, a tremendous amount of wood was needed to consume the body and even after hours of burning, great parts of the body remained. Compare with this the ease with which spontaneous combustion proceeds! He thinks that it is burning hydrogen which causes the intense heat and in the process the body-fat appears as drops of moisture on the walls and on the ashes of the remains. The stench, which is so often described, is caused probably by the stinking oil that is always produced at the burning of animal tissue. The rump of the body is always more easily destroyed, because in breast and abdomen there are greater cavities and softer cell tissue which serve to collect the combustible material while the extremities have a more compact structure and cannot be so easily burned.

Here (see Fig. 2) is a dissertation submitted at Leyden for a Doctor's Degree in 1764 by Dr. Jonas Dupont and entitled "De Incendiis Corporis Humani Spontaneis." This is a much less scientific treatise than Kopp's work. Dupont says that some men and animals can send forth light and sparks from their eyes. From this, he deduces that there must be a sort of an interior force or fire and that this can send fire into the body. He cites a case described by John Ruisch, Professor of Anatomy at Pisa in 1596. On the dissecting table was the cadaver of a woman who for four days before her death had eaten nothing, but whose stomach was swollen in a most suspicious manner. The dissecting room was dark. A young scholar held a candle near the body and when the stomach was opened, an explosion took place "with a loud noise and with green flames and distressing odors." Similar cases are given, but nothing of importance occurs in the dissertation until the second part of the discussion, on page 13, when the author cites some of the cases that we have already mentioned.

It appears, therefore, that Dickens in all probability had access to the Annual Register, from which Lair and Kopp take some of their cases. Nevertheless, in Dickens' time it seems as if very little were known about this type of death for he had to defend himself against a great deal of criticism. According to the knowledge of earlier times and the testimony given by Dupont, Kopp and Lair, Dickens was certainly justified in using spontaneous combustion as a horrible type of death, which was, he said, nothing of his own invention, but an actual fact.

As far as modern authorities go in the field of legal medicine and pathology, nothing is known of spontaneous combustion. Dr. George Burgess Magrath, Professor of Legal Medicine at the Harvard Medical School, has never heard of it.

The great book on forensic medicine written by Dr. Hans Gross of Gratz in Austria ("Handbuch für Untersuchungs Richter," Vol. II, p. 1078) mentions the subject in the discussion on fires that occur spontaneously or by accident. By this, he means fires that are caused by the chance concentration of the sun's rays through a burning glass and accidents of this kind. He speaks of spontaneous combustion as an impossibility and a superstition. In the past he thinks it has often been used to cover a real crime.

Dr. Jabez H. Elliott of Toronto has called my attention to the following passages from an article on spontaneous combustion in the Aesculapian Register (vol. I, no. 3, p. 19, published in Philadelphia in 1824). "Although events of this kind, that is the spontaneous combustion of human bodies, are extremely rare, yet we have some examples of them recorded in the Philosophical Transactions and in the Memoirs of the Academies of Paris and Copenhagen. It is there related that an Italian lady, the Countess Cornelia Bandi, was entirely reduced to ashes, except her legs, that an English woman called Grace Pitt was almost entirely consumed by a spontaneous inflammation of her viscera and lastly that a priest of Bergamo was consumed in the same manner. These spontaneous inflammations have been attributed to the abuse of spirituous liquors, but though the victims of intemperance are indeed very numerous these certainly do not belong to that number." These sentences are taken from Count Morozzo's paper on spontaneous combustion in the Memoirs of the Turin Academy of Arts and Sciences.

This article in the Aesculapian Register apparently caused some comment for in the next number (no. 14, p. 108, September 16, 1824) a contributor asked the following question. " In what is called spontaneous combustion of the human body, we may be (as physicians have been before now) called to see the victim while yet there is life. In such a case, what is the proper course to be pursued or can we by any means stop the flames and restore health? We are induced again to insert this question, although from past experience we have slender hopes of seeing it answered. We should be glad, however, if some of our readers would consider it and favor us with the result of their lucubrations."

Dr. Elliott has also discovered a case of spontaneous combustion which is reported in the Journal of Health, vol. 1, p. 288, published in 1830. Dr. Peter Schofield,[2] in a late address delivered at the formation of a Temperance Society, in the district of Johnstown, Upper Canada, states a case of spontaneous combustion, which occurred in his practice.—" It is well authenticated," says the Doc-

[2] Compare Caniff's " Medical Profession in Upper Canada," p. 615. He was a graduate of the College of Physicians and Surgeons of New York and served in the United States Army during the War of 1812.

tor, "that many habitual drinkers of ardent spirits are brought to their end by what is called 'spontaneous combustion.' By spontaneous combustion I mean when a person takes fire, as by an electric shock, and burns up without any external application. Trotter mentions several such instances. One happened under my own observation. It was the case of a young man about twenty-five years old. He had been an habitual drinker for many years. I saw him about nine o'clock in the evening, on which it happened. He was as then, as usual, not drunk, but full of liquor. About eleven on the same evening I was called to see him. I found him literally roasted from the crown of his head to the sole of his feet. He was found in a blacksmith's shop just across the way from where he had been. The owner, all of a sudden, discovered an extensive light in his shop, as though the whole building was in one general flame. He ran with the greatest precipitancy, and, on flinging open the door, discovered a man standing erect in the midst of a widely extended silver-coloured blaze, bearing, as he described it, exactly the appearance of the wick of a burning candle in the midst of its own flame. He seized him by the shoulder, and jerked him to the door; upon which the flame was instantly extinguished. There was no fire in the shop, neither was there any possibility of fire having been communicated to him from any external source. It was purely a case of spontaneous ignition. A general sloughing came on, and his flesh was consumed or removed in the dressing, leaving the bones and a few of the larger blood-vessels standing. The blood, nevertheless, rallied round the heart, and maintained the vital spark until the thirteenth day, when he died, not only the most noisome, ill-featured and dreadful picture that was ever presented to human view, but his shrieks, his cries and lamentations were enough to rend a heart of adamant. He complained of no pain of body—his flesh was gone. He said that he was suffering the torments of hell; that he was just upon its threshold, and should soon enter its dismal caverns; and in this frame of mind he gave up the ghost." The death of a drunkard may well be said to beggar all description.

Moreover, my colleague, Dr. Sanford Larkey, has told me that some years ago he saw in the British Medical Journal the report of a case of spontaneous combustion in which a female alcoholic was lying in a drunken stupor when a lamp or a small stove fell over on

her and she burned to ashes. I was unable to verify this reference in the indices of the B. M. J.

It is difficult to see how we can absolutely reject the testimony to the fact of spontaneous combustion given by the three writers that I have cited above and witnessed to by the extract from the Aesculapian Register. Nevertheless, the authority of Professor Gross and of Professor Magrath can scarcely be questioned. We have, therefore, a conflict of testimony. All that we can say is that spontaneous combustion so-called was accepted as a possibility during the nineteenth century.

Perhaps, no cases of it occur nowadays because people are more abstemious, drink less spirits or spirits that are comparatively pure. Besides, there is today little opportunity for fire or flames to reach a human body, because we have today few large open fires and few open oil lamps. Perhaps, there were once spontaneous combustions, but now they have disappeared. I think the reason is as follows. We know that when a body became soaked with alcohol, the final fatal fire could not start until the body or its affluvia were brought in connection with fire. In former days, this would happen very easily. People sat about open fires in the kitchens or in their rooms. They used candles and lamps with chimneys open at the top. In order to get warm, they had to come very close to their fires. All that is changed today. We very seldom see an open fire and heat all comes from radiators or similar arrangements. I do not believe that the most pronounced alcoholic could produce a spontaneous combustion by sitting on a hot radiator. She might burn herself, but she would not burn herself up. In modern life, therefore, it becomes less and less likely that alcoholics could come in direct contact with open flames. There are, of course, plenty of people still who absorb immense quantities of spirits, but there are very few of such absorbers who have open fires and oil lamps. It may be also that our modern spirits are sounder and better. Almost all the cases that we have cited from our three authorities were poor people who had to get drunk on very little money and who must, therefore, have been forced to buy the very lowest, vilest type of gin and other spirits. We may, therefore, feel more or less assured that if we restrict ourselves to really good Scotch and Rye and if we avoid open fires and sit on the radiators, we shall not, in all probability, combust spontaneously.

AN OUTLINE OF THE DEVELOPMENT OF THE HOSPITAL [1]

HENRY E. SIGERIST

The visitor landing in New York 200 years ago, in 1736, entered a city which, according to the census of 1731 had 1,400 houses and 8,628 inhabitants. Walking up Broadway he would see where the City Hall now stands a new wooden building and would be told that this was the *Publick Workhouse and House of Correction of the City of New York*. This was, in the words of Dr. Carlisle, "fifty-six feet long and twenty-four feet wide, two stories high, with a cellar. In the cellar on the east side were rooms for those put at hard labor and for weaving; in the middle was a store-room for the provisions, and on the west a strong-room or cage for the refractory, besides rooms for spinning, carding, etc. On the first floor, to the east, was the general dining-room, upstairs were quarters for the keeper and his family, and on the west the room especially set apart as the infirmary, and to be used for no other purpose whatever . . . a room about twenty-five by twenty-three feet, on the upper floor on the Broadway side, the primitive trace of Bellevue Hospital. It contained six beds. Its first medical officer was Dr. John Van Beuren. His salary was £100 a year, out of which he was expected to supply his own medicine.[2]

This certainly was not much of a hospital. The Philadelphians do not like it when the New Yorkers speak of having had a hospital built as early as 1736. There can be no doubt that the New York workhouse was not a hospital, it was nothing that could compare with the Pennsylvania Hospital built in 1752. It was a poorhouse and penitentiary, providing medical care for the sick inmates in its infirmary-room but it cannot possibly be compared to an institution erected for the sole purpose of treating patients. And yet we are justified in celebrating today the two-hundredth anniversary of the

[1] An address delivered on the occasion of the 200th Anniversary Exercises of the Department of Hospitals of the City of New York, at the New York Academy of Medicine, May 12th, 1936.

[2] Robert J. Carlisle, An account of Bellevue Hospital . . . , New York, 1893, p. 5.

inauguration of municipal hospital service in the city of New York because it cannot be denied that in this old workhouse the municipality gave free medical service to at least a few indigent sick. Besides, credit has to be given to the authorities for the fact that they appointed, not just a cheap quack to take care of the sick inmates of the workhouse, but an excellent doctor who, as a student of Boerhaave, had had the best medical training that Europe could give at that time.

The foreign visitor landing in New York a hundred years later, in 1836, would find that the city had greatly developed. The census of 1835 reported 270,089 inhabitants. He would hear that in the past hundred years the city had been visited by very serious epidemics of plague, yellow fever, typhus fever, cholera, compelling the authorities to take action. In 1794 a pesthouse was established at Kip Farm on a place called Belle Vue. The almshouse was removed to the same place in 1816 and a Fever Hospital was added in 1825. This complex establishment was still not a hospital in the modern sense of the word but a combination of jail, poorhouse and hospital. However, a first step towards improving the conditions was taken in 1836 when the male prisoners were transferred to Blackwell's Island, the women prisoners being removed two years later.

The visitor in New York in 1836, however, would find a real hospital in the city devoted exclusively to the care of the sick, New York Hospital. In 1769 Samuel Bard, one of the leaders of the medical profession in New York, in his commencement address at King's College said, " . . . it is truly a reproach, that a City like this, should want a public Hospital, one of the most useful and necessary charitable Institutions that can possibly be imagined.

" The labouring Poor are allowed to be the support of the Community; their Industry enables the Rich to live in Ease and Affluence, and it is from the Hands of the Manufacturer we derive, not only the Necessaries, but the Superfluities of Life; whilst the poor Pittance he earns will barely supply the Necessities of Nature, and it is literally by the sweat of his Brow, that he gains his daily Subsistance; how heavy a Calamity must Sickness be to such a Man, which putting him out of his Power to work, immediately deprives him and perhaps a helpless Family of Bread!

"Nor would the good Effects of an Hospital be wholly confined to the Poor, they would extend to every Rank, and greatly contribute to the Safety and Welfare of the whole Community . . .

"Another argument, (and that by no means the least,) for an Institution of this Nature, is, that it affords the best and only means of properly instructing Pupils in the Practice of Medicine; as far therefore, as the breeding of good and able Physicians, which in all Countries and at all Times has been thought an object of the highest Importance, deserves the consideration of the Public, this Institution must likewise claim its Protection and Encouragement." [3]

A charter was granted to the Society of the New York Hospital in 1771. A building was started but a fire and the Revolutionary War interrupted the development and it was only from 1791 on that New York Hospital began to serve its purpose. The mentally sick patients of New York Hospital were transferred to a separate building after a few years and the visitor of 1836 would find in the north of the city a handsome new building, Bloomingdale Asylum, opened in 1821.[4]

New York in 1836 had other medical facilities for the indigent sick. The New York City Dispensary was started in 1791. It was financed through voluntary contributions entitling the donors to have patients treated free of charge. Isaac Roosevelt was President, Richard Bailey and Samuel Bard were Senior Physicians. Twelve other physicians helped them in their work. In 1805 the New York City Dispensary was incorporated. It joined with the Kine-Pock Institution in 1815. The corporation of the city of New York gave land for a building.[5] An Eastern and Northern Dispensary were added in subsequent years.[6]

In 1818 an eye infirmary was established. It was incorporated in 1821 as New York Infirmary and in 1823 a department for the

[3] Samuel Bard, Two Discourses dealing with Medical Education in early New York, New York, 1921, pp. 15-17.

[4] A Psychiatric Milestone, Bloomingdale Hospital Centenary, 1821-1921. Privately printed 1921.

[5] Francis R. Packard, History of Medicine in the United States, New York, 1931, vol. I, pp. 244-246.

[6] Manual of the Corporation of the City of New York for the year 1850.

treatment of the diseases of the ear was added.[7] The city besides could show other welfare institutions, an institute of the deaf and dumb, an institute for the blind and the Lying-In Asylum.

These medical institutions were by no means sufficient for a city of nearly 300,000 inhabitants, nor were they ideal as far as equipment and service were concerned. But they represented a promising beginning and could compare not unfavorably with the institutions of other American cities.

A hundred years is a short period in history and yet the visitor landing in New York today, in 1936, will find the result of a development unique in history, a city grown to 7,6 million inhabitants, Bellevue no longer a penitentiary but a modern hospital of more than 2,000 beds, New York Hospital not only one of the biggest but one of the most beautiful buildings in the city, up in the north the imposing Columbia Presbyterian Center and in between innumerable hospitals both large and small, 19,000 municipal beds or 42,000 beds all in all serving the population of New York.

This tremendous development is characteristic of the hospital development in America in particular and of the development of the hospital in the western world at large. In 200 years America repeated 1,600 years of history of the European hospitals, going through all its phases at a tremendous speed and even surpassing the old world.

Two factors determine the history of the hospital; society on one side, medicine on the other side. It seems to me that three periods can be distinguished in the history of the western hospital. The first period begins in the early middle ages. There were hospitals before, to be sure. The Roman armies had very well designed military hospitals. A wounded or sick soldier weakened the fighting strength of the army and therefore had to be cured as soon as possible. Roman land owners had valetudinaria for their slaves. To lose a slave was to lose money. To take care of a slave in case of illness was to protect one's capital. Slave labor was becoming rare. Hospitals were erected in India and a famous inscription of the third century B. C. mentions that King Asoka had erected hospitals not

[7] E. H. L. Corwin, Rise of the Hospital Idea, Bulletin of the New York Academy of Medicine, 1933, vol. IX, p. 123.

only for sick men but also for sick animals. The guiding motive in this Indian development was the idea of Buddhist compassion.

In the early middle ages, however, welfare institutions of another kind were erected. They were the result of the Christian attitude towards the sick man. Disease was no longer considered a punishment for sin, no longer a matter that rendered man inferior. Disease and suffering at large gave a privileged position in Christian society. It was considered the duty of the Christian to take care of his sick and poor fellow men. The idea was not merely the humanitarian idea but much rather the idea of the community of the followers of Christ. Whoever joined the Christian church became a member of a definite community comparable to a family. Whenever a child becomes sick, the family feels responsible and whenever a member of the Christian family became sick or disabled or poor, the head of that family, the bishop, felt responsible and the welfare organization was under his direction. When Christianity became the official religion of the Roman Empire, the community was tremendously enlarged. The care of the sick and poor now became the concern of the whole state, of society at large.

The early welfare institutions in the western world were not hospitals in the modern sense of the word. They were xenodochia, guesthouses, poorhouses to provide food and shelter to the poor, to the wanderer and pilgrim. They were often built outside the city wall because it was considered safer not to let the strangers into the city. No medical treatment was given in these places unless incidentally. The monasteries had infirmaries for the sick brothers but did not serve the community.

The second period in the history of the hospital begins in the thirteenth century. The driving force for the development is to be sought in the growth of the cities. The cities became more and more influential in the political life of the nations. The rural districts had to seek the protection of a war lord. The cities, however, became wealthy enough to hire their own soldiers and to defend themselves. They sought, and in many cases, obtained political independence. A city is an infinitely more differentiated and specialized social organism than a rural district. In the cities great wealth and extreme poverty are housed side by side. This is not only the

case today but it was the case in the later middle ages as well. It was up to the authorities and the wealthy citizens to provide means to care of the indigent and sick. From the thirteenth century on a great many new hospitals were erected all over the western world. They were founded by the church or by the cities, were often founded by the church and then taken over by the municipal authorities. These institutions were built inside the city walls as an integral part of the community. In 1204 Pope Innocent III created the hospital of Santo Spirito in Rome setting a model for many similar institutions. The French cities had their Hôtel-Dieu usually located near the cathedral, open to all creeds and all nationalities.

These new institutions were not yet hospitals in the modern sense of the word either. They were the welfare centers of the cities containing poorhouses, hospitals for the indigent sick and infirmaries for old people. It was not only the indigent old people who sought refuge in these places. Many well-to-do citizens, having lost their families, would turn over their entire property to the hospital, purchasing in this way the privilege of being taken care of for the rest of their lives. How often it could happen in those days of relentless war and pestilence that entire families were wiped out and that only some old members of their families survived! They felt lonely and preferred to end their lives in such a hospital. Many of the monumental hospitals that the tourist visits in Italy, Spain, France owed their wealth to this custom. Medical service was given to the sick inmates of the hospital as a rule by the municipal physician who was the sanitary officer of the city. In quite a few places the municipal doctor was at the same time professor in the medical faculty and on his rounds in the hospital he was accompanied by his students.

In the Renaissance we find an increasing tendency to improve medical service in the hospitals, in quantity as well as in quality. Professor Sudhoff believes that the occurrence of syphilis was, to a certain extent, responsible for this development.[8] Many cities hospitalized their syphilitics and they did so in order to have them

[8] Karl Sudhoff, Ein Wendepunkt im Krankenhauswesen des Abendlandes. Archiv für Geschichte der Medizin, 1929. vol. 21. pp. 246-247.

cured in the hospital. The lepers were isolated without medical treatment being given to them. The syphilitic, however, had to be treated and this required the presence of physicians. From the sixteenth century on most hospitals provided regular medical service. This service, however, was as a rule insufficient. The living and hygienic conditions of most hospitals were bad and we find in many descriptions that these old hospitals were much dreaded places. Whoever could afford to be treated at home never went to the hospital. It was a place for the poor who entered it for their final agony. The city of Angers in the middle of the eighteenth century, eager to develop its textile industry and in order to attract workers, promised them privileges, one of them being that in case of illness, the worker would be hospitalized and would have the right to use one bed all alone by himself.[9]

A new period in the history of the hospital sets in in the second half of the nineteenth century. While the driving forces in the previous periods were social forces, it was the progress of medicine and surgery which now called for a new type of hospital. Before the introduction of anaesthesia surgery was limited to definite number of more or less standardized operations. Anaesthesia opened up new horizons to surgery and asepsis required conditions that could not be provided in the private home. The surgical patients of all classes went to the hospital. In the same way, in medicine, the diagnostic methods became more and more complicated requiring equipment that had to be provided by the hospital. The specialties made special demands and the rise of obstetrics brought a new note into the hospital.

Through all these developments the character of the hospital changed fundamentally. It was no longer a place to provide food and shelter for the indigent, no longer an institution in which charity service was given to the sick poor exclusively. From the dreaded place where people went to die, the hospital became a medical center to which the patients of all classes go seeking recovery, a place in which new life is brought to light.

[9] C. Tollet. De l'assistance publique et des hôpitaux jusqu'au XIX[e] siècle, Paris, 1889, p. 43.

Looking at the American development we will find that the American hospital went through all these phases. The first institutions in the territory of the United States were guesthouses, poorhouses. Such a guesthouse was erected as early as 1612 in Henricopolis in Virginia on the St. James River. Such a house was Blockley in Philadelphia (1732) and was " l'Hôpital des Pauvres de la Charité " in New Orleans, organized in 1736, in the same year in which the poorhouse of New York was built. Medical service was given to the sick inmates of such places, but these places did not serve the community at large. They had the same function that the xenodochia had in the early middle ages.

In the second period real hospitals were founded as places in which medical treatment was given to the indigent sick, the Pennsylvania Hospital in 1752, the New York Hospital in 1791, the Massachusetts General Hospital in 1821. These hospitals were, as a rule, infinitely better than many contemporary European hospitals. In Europe most hospitals were old and it was difficult to modernize them. America, unhampered by tradition, could avoid mistakes made in Europe. The new hospitals were carefully planned. The men responsible for them went abroad studying the conditions. Their reports are extremely revealing. The new hospitals built in this country in the eighteenth and early nineteenth centuries were greatly admired by European visitors.

The tremendous development of the nation in the course of the nineteenth century, the rapid growth of the population necessarily led to unsatisfactory hospital conditions. It was not possible to keep step with this development. The hospitals were often crowded and had poor hygienic conditions. Toward the end of the century medical science became such that it required a different standard in the hospital and so America entered the third period creating modern hospitals for all classes of the population, centers of diagnostic and therapeutic work. In the readjustment that has taken place in the last decades, great organizations like the American College of Surgeons, the American Medical Association and many local medical organizations had a definite influence in increasing the number of hospital beds available and in raising the standards.

This development is by no means completed. The history of the

modern hospital is short and, as a matter of fact, was started only yesterday. There are still great problems to be solved. One of the chief tasks of the present time is to make the hospital easily available not only to the indigent and to the wealthy patients, but to the great mass of the population that has to live on low incomes. Besides, the hospital still has great possibilities of increasing its field of action by including not only diagnostic and therapeutic work but preventive medicine as well.

However, it is not my task today to discuss the future of the hospital. This will be done by the next speakers. What I tried to do was to give a very sketchy outline of the development of the western hospital.

TEXTS AND DOCUMENTS

EARLY COLLECTIONS OF SYPHILOLOGIC WORKS

Aloysius Luisinus and His Influence on Syphilology

E. L. ZIMMERMANN

At the very time when the printing press was outgrowing its cradle, mankind was brought face to face with syphilis. The novelty of copying from old manuscripts, from old masters, was wearing off. Men were beginning to question their Pliny, their Avicenna. New and original material was finding a ready market. What more natural than that the printer should welcome matter dealing with this newly recognized disease, so unorthodox in its manifestations and in its treatment. The numerous treatises devoted to syphilis struck off in a short five years (1496-1500) attest this great interest. Witness the fact that three of these incunabula underwent more than one printing as such. That of Widmann left the press twice, of Leonicenus three times, of the layman Grünpeck seven times!

With the accumulation of works on syphilis, it is little to be wondered that some alert printer, with an eye on his coffers, should hit upon the idea of offering a collection of such treatises, one which would present a comprehensive survey of the subject. In fact, in 1516, appeared the first attempt at assembling such knowledge. True, these first collections were not entirely devoted to syphilis, but, as will be seen, were built around popular medical works. Not until 1532 was published a collection of treatises, entirely devoted to syphilis, the so-called *Collectio sine loco*. With increasing understanding of the disease and its treatment, such works continued to leave the press until the appearance of the imposing tomes of Aloysius Luisinus (1566-1567).

As previously stated, the earliest such collections appeared in 1516. Indeed, in that very year, three presses were busy with such publications.

I. Collectio Veneta Prima.[1]

Marci Gattinariae super Nono Almansoris. Blasii Astarii de Febribus. Sebastiani Aquilani de Morbo gallico. Eiusdem de Febre sanguinis. Nicolai Leoniceni de Morbo Gallico. Antonii Scanaroli Mutinensis disputatio de morbo gallico. Antonii Benivenii de morborum mirandis causis. Joannis Almenar Hispani de Morbo Gallico. Venetiis. Sumptibus heredum Octaviani Scoti et sociorum. 1516. Folio.

Five of the seven treatises contained in this collection are concerned in part or *in toto* with syphilis. The venerable Leonicenus, still alive and active at Ferrara at the age of 88, has little to offer on syphilis, but his treatise is a favorite one and continues to be included in subsequent collections. Scanarolus, his disciple, has even less of practical value to offer, his treatise being a defense of Leonicenus against Natalis Monthesaurus of Verona, who has taken offense that the Ferrarese professor should have criticized the great Avicenna in his *Libellus de morbo gallico*.[2] Almenar offers much useful information. He describes in fair detail the application of mercurial inunctions. Benivenius (1507, posthumous) has a short section on *Morbus gallicus*. But why should Gattinaria and Astarius have been included in this collection? There is not a word on syphilis in their treatises. The fact is that as early as 1506 there had appeared at Lyons from the press of Symon Bevilaqua for V. de Portonariis a collection of the works of four authors: the *De curis egritudinum* of Marcus Gattinaria; the *De curis febrium* of Blasius Astarius and of Caesar Landulphus; the *De morbo gallico* and the *De febre sanguinis* of Sebastianus Aquilanus.

Here we have a work intended to serve as a general storehouse of medical knowledge for the physician. Only Sebastianus Aquilanus contains information on syphilis. As to Gattinaria, little is known about him except that he taught at Padua. He was still alive in 1481 for he tells of a cure he undertook in that year. Pagel calls him an Arabist 'vom Scheitel zur Sohle.' His *De curis egritudinum* is

[1] This collection was unknown to Astruc. Accordingly, what was designated by him as the first Venetian collection is actually the second.

[2] All three works are reprinted in facsimile in Sudhoff's *Zehn Syphilis—Drucke aus den Jahren 1495-1498*, Milan, 1924.

based on the ninth book of the *Liber ad Almansorem* of Rhases, the celebrated *Nonus Almansoris* of the late Middle Ages, a favorite textbook and the subject of many commentaries. As is indicated by its other title, *De aegritudinibus a capite usque pedes*, it is a general survey of diseases considered in the traditional fashion from 'top to toes.' Astarius' *De curandis febribus*, [*Ab Aben Haly super primam quarti traditus*] as well as the similar treatise of Caesar Landulphus are written in the identical vein. They are all Arabists of the first water. So Sebastianus Aquilanus,[3] himself a dyed in the wool Arabist, sleeps among good bedfellows. He was active in the disputations held at Ferrara in 1497, where Leonicenus held forth, and with much quoting of Arabian authorities, he attempts to establish the identity of syphilis and leprosy.

This same collection of four authors was reprinted at Pavia in 1509 by Jacob de Burgofrance. Proksch[4] sees fit to list this as *Collectio Papiensis I.* Were Proksch consistent, the Lyons edition of 1506 of this work should be designated as *Collectio Lugdunensis I.* But as will be noted by referring to the appended table, he gives this title to an entirely different collection published in Lyons in 1532. As it contains but one work which mentions syphilis, it should be rejected from so-called collections of syphilologic treatises. The fact is that this group of authors apparently enjoyed a tremendous popularity among physicians as is evidenced by its repeated publications: Lyons 1506, 1525, 1532, 1539, 1542, 1560; Pavia 1509; Bologna 1517; Venice 1521; Basle 1537; Paris 1570; Frankfort 1604. Unquestionably our *Collectio Veneta prima* has its groundwork in this favorite text. Landulphus has been dropped and there have been added the treatises of Leonicenus, Scanarolus, Benivenius and Almenar, all of which discuss *Morbus gallicus.*

II. Collectio Papiensis I.

Nicolai Leoniceni, Vicentini, Liber de morbo Gallico; Joannis Almenar, Hispani, Liber de morbo Gallico; Angeli Bolognini, Bononiensis, de cura ulcerum exteriorum et unguentis communibus in

[3] This 1506 imprint of the *De morbo gallico* of Sebastianus Aquilanus is the earliest known. The supposed *editio princeps* of 1497 or 1498 is apparently lost.

[4] Literatur über die venerischen Krankheiten etc., Bonn, 1899-1900.

solutione continui. Lib. II; Alexandri Benedicti, Veronensis, Liber de Pestilenti Febre; Dominici Massariae, Vicentini, de Ponderibus et mensuris medicinalibus, Lib. II. Ex officina Bernhardini de Garaldis. Papiae. Folio.

Here we have the treatise on ulcers by the surgeon, Angelus Bologninus, a good mercurialist as was the Spaniard Almenar. Alexander Benedictus, professor of anatomy at Padua, offers a plague tract.

III. Collectio Bononiensis I.

Plinius Secundus, Cajus. Medicinae Libri V et alia aliorum opuscula./ Aureum opus et sublime ad Medellam non parvum vtile Plinij . . . nonnullaque/ opuscula videlicet Joannis Almenar: Nicolai Leoniceni interpretes . . . ambobus;/ De morbo gallico . . . : An-/geli Bolognini D'cura vlcerum exterio/rum: Alexandri Benedicti de peste:/ et Dominici [Massariae] Arcignanei de pon/deribus et mensuris.

Bononiae. Hieron de Benedictis, 1516. fol.[5]

The contents of this collection are identical with those of the previous one, with the exception that *Pseudo-Pliny* has been added.

IV. Collectio Sine Loco.

Contenta./ Nicolai/ Massae Veneti, artivm/ & Medicinae Doctoris, Liber de Mor-/bo Gallico, mira ingenij dexte-/ritate conscriptis./ Ioannis Almenar Va-/lentini Hispani, Philosophi ac Medici,/ Liber perutilis, de Morbo Galli-/co VII. capitulis quicquid/ desideratur com-/plectens./ Nicolai Leoniceni Vin/centini, fidissimi Geleni interpretis/ compendiosa eiusdem/ morbi cura./ Angeli Bolognini medi-/ci eximij, Libellus de cura ulcerum exte/riorum. Et de Vnguentis, in soluta con-/tinuitate, à modernis maxime/ usitatis, in quibus multa ad/ curam Morbi Gallici/ pertinentia, inser-/ta sunt.

Colophon: Anno. M. D. XXXII. (sine loco et anno).

(Library of the Surgeon General, Washington, D. C.).

The title of this collection, of which Astruc comments, "Venetiis editam fuisse suspicio est," abounds in superlatives. Here is offered

[5] This rare collection was recently offered for sale by C. E. Rappaport of Rome. He has kindly given the desired information as to the title and printer.

for the first time a collection of treatises entirely devoted to syphilis. It is actually a valuable collection from the standpoint of the contemporary physician. Almenar, Massa and Bologninus, all staunch mercurialists, are rich in practical knowledge.

V. Collectio Veneta II (Veneta I of Astruc).

Liber de mor-/bo gallico, in qvo di-/uersi celeberrimi in tali materia scri-/bentes, medicine continētur/ auctores videlicet./ Nicolavs Leonice-/nus Vicentinus./ Vlrichvs de Hvt-/ten Germanus./ Petrvs Andreas/ Mattheolo Senensis./ Lavrentivs/ Phrisius./ Ioannis Alme-/nar Hispanus./ Angelvs Bo-/logninus./ Venetiis. M D XXXV.

Colophon: Venetiis per Ioānem Patauinum & Ven-/turinum de Ruffinellis, Anno do-/mini M D XXXV.

Appended: Nicolai/ Poll. medicinae pro-/fessoris, & Sacrae Caesareae Maie-/statis Phisici, De cura Morbi/ Gallici per Lignum/ Guaycanum,/ Libellus./ M D XXXV. (By the same printer).

(Library of the Surgeon General, Washington, D. C.).

A wood, so miraculous in its cure of syphilis that it was gratefully called *lignum sanctum*, had been brought from the new world. It had so found the popular favor that it threatened to displace mercury. In Augsburg the Fuggers were weighing out the new medicine. And in this city appeared in 1519 Hutten's treatise on guaiac. Matthiolus, commentator of Dioscorides, treats of the wood at length. Why Laurentius Phrisius (Phrysen, Friese), said to be a Hollander who practiced in Colmar and Metz, should have been included, is indeed puzzling. His *Epitome opusculi de curandis pusculis* (sic!), *Ulceribus et doloribus morbi gallici, mali frantzosa appellati*, first printed in quarto in 1532 at Basle by Henricus Petrus, is so primitive that it seems hard to date the work almost four decades after recognition of the disease. Not a mention of guaiac! For Phrisius, all mercurialists are *medici porcini*. To this collection, (as is the case in the copy in the *Surgeon General's Library*), is usually appended the *De cura morbi gallici per lignum guayacanum libellus* of Nicolaus Poll, physician to Charles V. The *editio princeps* of 1518 of this work has been lost. Possibly the printer saw fit to add this treatise which had been written at the command of an emperor.

VI. Collectio Basileensis I.[6]

Morbi galli/ci cvrandi ratio exqui/sitissima, a varijs, ijsdemque peritissimis/ medicis conscripta : nempe/ Petro Andrea Mattheolo Senensi./ Ioanne Almenar Hispano./ Nicalao Massa Veneto./ Nicolao Poll Caesareae Maiest. physico./ Benedicto de Victorijs, Fauentino./ His accessit Angeli Bolognini de ulcerum exteriorum/ medela opusculum perquam utile./ Eivsdem/ De unguentis ad cuiusuis maligna ulcera/ conficiendis lucubratio./ Cum Indice rerum omnium quae in curationem cade/re possunt copiosissimo./ Basileae, apud Joan. Beb. elio/ D. M. XXXVI. 4to.

A new name! Benedictus Victorius, professor at Bologna. But at the end of his *De morbo gallico* in the first tome of *Luisinus* he calls this work a bastard child: Nunc vero hujus operis finem constituam, et eorum omnium, quae ego Benedictus Victorius, de morbo gallico, et ejus cura anno aetatis meae septuagesimo conscripsi, dum medicinae Theoricam ordinariae in Gymnasio Bononiensi doctissimo edocerem, ut non solum auditores meos, sed et omnes lectores hujus meae auspicationis de morbo Gallico certiores redderem. Tractatulum vero quendam alium de Gallico morbo, Basileae impressum (ex officina mea non erutum) mihi tamen adscriptum audio a quibusdam errore ductis, nisi forte fortuna id contigerit, ut per modum empiricum praesidia quaedam morbo convenientia Gallico, quibusdam meis olim discipulis, qui ad hoc me impulerint, condonarem.

VII. Collectio Lugdunensis I.

Identical with the previous collection except in different type and 8vo instead of 4to. Lugduni, expensis Scipionis de Gabiano et fratrum, anno 1536, mense Augusto.[7]

[6] As *Collectio Basileensis II*, Proksch designates the previously mentioned group of authors, Gattinaria, Astarius, Landulphus and Aquilinus printed at Basle in 1537 by Henricus Petrus. But as in the case of his so-called *Collectio Papiensis I*, the same objection obtains against including it in our list.

[7] Morbi gal/lici cvrandi ratio ex-/quisitissima, à varijs, ijsdemq; peritissimis/ medicis conscripta: nempe/ Petro Andrea Matthaeolo Senensi./ Ioanne Almenar Hispano./ Nicolao Massa Veneto./ Nicolao Poll Caesareae Maiest. physico./ Benedicto de Victorijs, Faventino./ His accessit/ Angeli Bolognini de vlcerum exteriorum/ medela opusculum perquam vtile./ Eivsdem./ De vnguentis ad cuiusuis

VIII. Collectio Veneta II. Collectio Aloysii Luisini.

De morbo gallico omnia quae extant apvd omnes medicos cvivscvnque nationis, Qui vel integris libris, vel quoquo alio modo huius affectus curationem methodice aut empirice tradiderunt, diligenter hincinde conquisita, sparsim inuenta, erroribus expurgata, & in vnum tandem hoc corpus redacta. In quo de Ligno Indico, Salsa Perillia, Radice Chynae, Argento uiuo, caeterisque rebus omnibus ad huius luis profligationem inuentis, diffusissima tractatio habetur. Cum Indice Locvpletissimo Rerum omnium scitu dignarum, quae in hoc uolumine continentur. Opus hac nostra aetate, qua Morbi Gallici vis passim uagatur, apprime necessarium. Catalogum Scriptorum sexta pagina comperies. Tomvs prior. Venetiis, apud Iordanum Zilettum, 1566. (Tomus alter, 1567) Folio.

Here is a massive folio of two volumes containing some sixty authors. The first volume, dedicated to Nicolaus Massa, contains works on syphilis already in print at the time of publication of this collection. The second is dedicated to Bernardinus Tomitanus and is comprised of works which are copied from manuscript and are now printed for the first time.

The fame of Aloysius Luisinus, physician in Udine, rests entirely on the above work. His other writings are forgotten.[8]

In 1599 appeared a spurious ' reprint ' of Luisinus: Aphrodisiacus sive de Lue venerea in duo volumina bipartitus, continens omnia quaecunque hactenus de hac re sunt ab omnibus Medicis conscripta, ubi de Ligno Indico, Salsaparillia, Radice Chinae, Argento vivo, caeterisque rebus omnibus ad hujus luis profligationem inventis, diffusissima tractatio habetur. Opus hac nostra aetate, qua morbi

generis maligna vlcera/ conficiendis lucubratio./ Cum Indice rerum omnium quae in curationem ca-/dere possunt copiosissimo./ Lugdu. M. D. XXXVI.

Colophon. Lvgdvni,/ Expensis Scipionis de Gabiano, & Fratrum./ Anno 1536./ Mense Augusto.

The Surgeon-General's copy is graced with the following inscription in the hand of a great bibliographer: "Ex libris Ludovici Choulant. Dresdae 1827. Vide De morbis venereis II. 660." And he adds "seltene Samlung."

[8] De Compescendis animi affectibus per moralem Philosophiam et medendi artem, Basle, 1562. Tractatus de confessione aegrotantium a die decubitus, Venice, 1563. At Venice, *Apud Juntas*, also appeared: Aphorismi Hippocratis Hexametro carmine conscripti.

DE

MORBO GALLICO

OMNIA QVAE EXTANT

APVD OMNES MEDICOS

CVIVSCVNQVE NATIONIS,

Qui vel integris libris, vel quoquo alio modo huius affectus curationem methodicè aut empiricè tradiderunt, diligenter hincinde conquisita, sparsim inuenta, erroribus expurgata, & in vnum tandem hoc corpus redacta.

In quo de Ligno Indico, Salsa Perillia, Radice Chyna, Argento uiuo, caterisq; rebus omnibus ad huius luis profligationem inuentis, diffusissima tractatio habetur.

Cum INDICE LOCVPLETISSIMO Rerum omnium scitu dignarum, quæ in hoc uolumine continentur.

Opus hac nostra ætate, qua Morbi Gallici vis passim uagatur, apprimè necessarium.

Catalogum Scriptorum sexta pagina comperies.

TOMVS PRIOR.

Venetiis, apud Iordanum Zilettum, 1566.

FIG. 1. Title Page of First Volume of Editio Princeps of the Collectio Luisini.

Gallici vis passim vagatur, apprime necessarium, ab excellentissimo Aloysio Luisino, Utinensi, Medico celeberrimo novissime collectum. Venetiis. Apud Baretium & Sociis. 1599. Folio.

A fraudulent attempt to put one over on the book trade! Only the title page of the original edition has been changed. Even the name of the original printer, Zilettus, is retained with the year 1566 at the end of the first volume. Astruc remarks: quae fraudis species apud Bibliopolas nunquam rara fuit.

Finally, in 1728, appeared the famous Boerhaave edition of Luisinus: — Lugduni Batavorum, Apud Johan. Arnold. Langerak, et Johan. et Herm. Verbeek, Bibliop. MDCCXXVIII. From the title page it is evident that Boerhaave used the fraudulent 'reprint' of 1599. The wording of the two title pages is identical. Only in spelling are there minor differences, such as Salsa Perilla instead of Salsa parillia, Radice Chynae instead of Radice Chinae. Apparently by Boerhaave's time, the original Luisinus had become rare and costly. The occasion for its reprinting is interestingly related by Boerhaave himself in his preface: "Pulchre memini, quanto perfusus gaudio Huttenii libellum his insertum quondam perlegerim, quum ea forte tempestate curationi meae se dederet nobilis aeger, qui incassum Optimorum Medicorum consilia sequutus, atque frustra hydrargyri vim expertus, pro desperato relictus fuerat, tamen recte dein hoc methodo (i. e. by drinking decoctions of guaiac) convaluit. . . ." And Boerhaave enthusiastically recommends the reading of the *Aphrodisiacus* to his pupils." . . . Evenit inde, ut neglectum pridie opus, atque flocci habitum, quaereretur avide, caro valde vaeniret pretio, brevique desideraretur ubique." Unquestionably such praise on the part of a Boerhaave would have so raised the price of the original edition that it was too expensive for the average physician or student. Hence the new edition of 1728. Luisinus (from now on the book is usually referred to as such and the 1728 edition is meant) over night became a very popular and much quoted work. In England, as will be seen, it aroused renewed interest in the old syphilographers.

In his preface, subsequently often translated and quoted, Boerhaave gives a summary of his theory of the etiology of *Tabes Aphrodisiaca*, as he clumsily calls it. The disease is due to a corruption

of the fat lodged in the *panniculus adiposus cellulosus*, a structure which corresponds very closely to our connective tissue with its generalized distribution.

In 1736, eight years after Boerhaave republished Luisinus, there appeared the first edition of what (to my mind at least) is the greatest work on syphilology, the *De venereis morbis* of Jean Astruc, this time in a single volume and in six books. The fifth and sixth books consist of an *Index chronologicus auctorum, qui de lue venerea scripserunt ab ingressu morbi . . . ad hanc usque diem, cum brevi plerorumque operum, analysi & epicrisi.* Luisinus does not escape the critical eye of the Parisian savant. Astruc can overlook that Luisinus failed to include the Germans Grünpeck, Widmann, Schellig and Remaclus Fuchs, the Frenchman Béthencourt, the Spaniards Villalobos and Deligado. But that he should have omitted his own countrymen, Angelus Bologninus, Roverellus, Thoma Rangonus! Moreover, he is guilty of failing to list his authors in chronological order, to give biographical data, as a result of which we know nothing of Gilinus, Scanarolus, Cataneus, Vella and others. He has willfully left off prefaces and dedicatory letters; he has failed to list the date of first editions, as a result of which we know nothing of the *editio princeps* of Cataneus,[9] Almenar,[9] Poll and others; he has whittled away with a bold hand from the original texts. As to the Boerhaave edition, he laments: Sed utinam Illi (Boerhaave) satis otii fuisset, ut susceptum hanc utilissimi Operis Editionem perfecte adornare potuisset, et Aloysii Luisini peccata emendare. . . .

Proksch is even more critical of Luisinus, whose work he dubs a 'kopfkranke Machwerk.' He can forgive his omissions, his failure to list the various treatises chronologically, the lopping off of prefaces and dedicatory letters. "Dass Luisinus aber sogar die Titel der

[9] We now know the *editio princeps* of one of these syphilographers. That of Cataneus de Lacumarcino did not appear as early as 1505 as Astruc surmised. From E. C. Streeter's ms of 1524 (XVII Internat. Congr. Med., Sect. XXIII, London, 1913-1914) the first printed edition could not possibly have been earlier than that year. The Surgeon-General's Library has a Turin edition of 1532 (Bernardinus Silva Calcographus Taurini, 4to). The *princeps* of Almenar's *Libellus ad evitandum et expellendum morbum gallicum, ut nunquam revertatur noviter inventus ac impressus* was printed in 4to by Bernardinus Venetus de Vitalibus in Venice in 1502.

meisten Schriften willkürlich abgeändert, gekürzt, und die Jahreszahlen, Druckorte etc. gewöhnlich nicht angegeben hat, ist eine bodenlose Albernheit, die jedem, der sich in dem Werke zurecht finden und sich nicht auf die Angaben der Vorarbeiter verlassen will, lange und schwere Arbeit kostet, und die, weil eben die meisten Schriften schon lange nicht mehr aufzutreiben sind, eine heillose Confusion in die chronologische Reihenfolge der ältesten Syphilographen gebracht hat." A lament coming from the very soul for Proksch labored long and hard in his attempts to untangle the snarl.

The re-edition of Luisinus by the great Boerhaave brought the work from obscurity into broad daylight. It left its reflections on England. At the very time that Astruc was working on his *De morbis venereis*, Daniel Turner and John Armstrong were hard at work preparing a synopsis of the various authors contained in the *Aphrodisiacus*. Astruc's work, however, antedates both and it was with no little chagrin and disappointment that the Englishman and the Scot saw their labors dwarfed by the Frenchman. Astruc's work remains a masterpiece of medico-historical research, the works of Turner and Armstrong are almost forgotten.

Daniel Turner cuts a curious figure in the history of syphilis. To us in this country, he is of special interest in that he shrewdly wheedled out of Yale, without ever setting foot on our soil, the first medical diploma awarded in the Colonies, an honorary degree. This blustering, garrulous fellow, a spicy raconteur and interesting prattler, who, with only the training of a surgeon, connived to be admitted as a licentiate to the College of Physicians of London and who graces his portrait with the incongruous words ' nullius in verba,' had, in 1532, published his *Siphylis* (sic). *A Practical Dissertation on the Venereal Disease*. In the 1736 edition of the *De morbis venereis*, Astruc sneers at the work of the gossipy Turner : Nimius esse videtur in agitandis iis, quae ad se tantum spectant et in sui defensionem scripta sunt. Iis etenim, etiam si vera forent ac legitima, cum ad rem plerumque non pertineant, constat Lectoribus nauseam moveri, atque adeo Operis pretium non parum elevari.

When Astruc's work first came into the hands of Turner, the latter must have impatiently thumbed his way to the criticism of his *Siphylis* and hit upon the above unsavory remark. Turner's keen mind at

once grasped the inaccuracies and deficiencies of his own *Aphrodisiacus* [10] about to be published. But it was too late. The printer had already struck off most of the sheets. He could at least add to his preface a few remarks directed at Astruc. But he realized it would be folly to attack the meticulous Astruc when his own work is so riddled with glaring errors. Shrewdly paying seeming compliments to Astruc, he makes use of the *De morbis venereis* to pay back a more vulnerable enemy. One Nicolas Robinson in his "A New Treatise on the Venereal Disease" of 1732 had recommended the administration of mercury without salivation, a method instituted by Chicoyneau at Montpelier in 1718 and still in vogue among the faculty of that university. Astruc in Paris, to the contrary, was a strong exponent of the necessity for a copious salivation in the cure of syphilis. In discussing recent progress in syphilology, Robinson had remarked: "There has been, it seems, very little Material communicated to the World upon this Head, for one hundred Years past, unless from Mr. Wiseman and Dr. Gideon Harvey. Some Quacks, indeed, have pilfer'd Books, to furnish out a Twelve-penny Pamphlet, or so; whilst others have stuffed theirs with bawdy Tales, and Scraps of old Ballads." Now it so happens that Turner is full of anecdotes which well deserve to be called bawdy and he feels the shoe fitting his foot. Here is an opportunity to even up the score. So in the preface of his *Aphrodisiacus* he parades before Robinson's eyes the various Englishmen, whose works are reviewed in Astruc's *De morbis venereis libri sex*, Clowes, Winell, Manwaring, Wiseman, Sydenham, Abercromby, Martin Lister, Walter Harriss, Cockburn and himself.

[10] Aphrodisiacus, containing a Summary of the Ancient Writers on the Venereal Disease, under the following Heads: I. Of its Original; II. Of the Symptoms; III. Of the various Methods of Cure. London. Printed for John Clarke. 1736.

In the preface, Turner attempts to shift the blame for his many bibliographic errors from his own shoulders. He lamely comments: "I cannot chuse but think it an Omission in this Revisal of the ancient Writers that no Care was taken about the Dates of their first Publications, which might have guided us to the Time of Precedency the one of the other. That little Assistance I got herein, (for I had not seen Dr. Astruc's treatise till most of these Sheets were printed off) was from Vander Linden [De scriptis medicis, 1637], who takes Notice of some of their Editions, but refers generally to the two ancient Tomes De Morbo Gallico i. e., the original edition of Luisinus; which whether or no therein enter'd, I am altogether uncertain, who have never seen them neither."

Not one escapes with a whole hide when the ' learned Foreigner ' has finished with them. Had not Sydenham denied that his countrymen need seek France to cure their pox? French practitioners, skilful though they may be, understand the method of conquering the disease not a whit better nor worse than the English ones. At Walter Harriss, Astruc scoffs " he seems truly to be as superstitious as an old woman, in relating the story of an infant of six months, which upon the death of Charles II, King of Spain, on the Christmas Eve preceding the year of 1700, upon coming out of a convulsive fit, for a quarter of an hour together distinctly uttered the following words alternately: O God! O Jesus!" Which miracle Harris believed " prophetical of that bloody war, ensuing presently after." And so Astruc makes each Englishman walk the plank.

Now for Robinson! How it grieves Turner that " the Author of the New Treatise came too late for the Catalogue [i. e., to be critized by Astruc]; that the great Discoveries he has made with those Eyes of his might for the Good of his Fellow Creatures have been transmitted to all parts of Europe; altho', to be serious, if my Judgement may have any Weight, who for forty Years past have been as conversant in this Branch of Practice as most others, and was requir'd as to the Preference of the two new Writers; it must be deliver'd on this wise, viz., as the New English Treatise is the most worthless and insignificant, so the New Latin one of Dr. Arnoc [Astruc], however free he has made with my countrymen, as well as myself, (setting aside some Absurdities in his own Practice) contains not only the most ample Collection, but affords us also the most useful and instructive History of the Venereal Disease that is hitherto extant."

In 1740 appeared the second Parisian [11] edition of Astruc's *De morbis venereis*, again from the press of William Cavelier on James Street at the Sign of the Golden Lilly, this time in two tomes and in nine books. In building up his *Bibliotheca aphrodisiaca*, Astruc searched the rich Parisian libraries, the Regia, that of the *Collegium Mazarin*, of the *Collegium* of Louis the Great, of the Cardinal de Rohan. His friend, Thomas Stack, across the Channel, carefully described for him rare items in the library of Sir Hans Sloane. He

[11] The Basle printer Johannes Rodolphus Im-Hoff had in 1738 issued a pirated edition of the *Libri sex*.

turned for aid to such men as Morgagni, Johannes Fontanus, Antonius Leprotus and Heucher. He scorned no book on venereal. As he nicely puts it: Versanda habui fimeta et sterquilinia non pauca, ex quibus unum aut alterum auri granum colligerem, ut a Virgilio dictum narrant de Libris Enii. Sed laboris haud parcus sterquilinia versavo curiose, sed Libros evolvi sedulo etiam inficetos, et minore ideo fastidio, quia memor Pliniani dicti, *Nullum esse librum tam malum, ut non aliaque ex parte prosit.*"

In this edition Astruc has a few words to say about Robinson's treatise. Possibly to spite Turner, he highly compliments the author: Liber ille accuratus est, clare, dilucide, methodoque facili et recta scriptus. But there is plenty in store for Turner. Since the appearance of the first edition of the *De morbis vereneis*, Astruc has subjected Turner to a closer scrutiny. He has looked up his man. He is now aware that Turner has connived, in some fashion or other, to attain the title of licentiate in the College of Physicians of London without possessing a university degree. So he prefaces his remarks on the *Siphylis* of 1717 with the following:

"Daniel Turner, Anglus, Chirurgiae operam juvenis dedit, quam Londini exercebat anno 1675, cum ededit *Apologiam chirurgicam* anglice scriptam. Sed illi deinde visum est Medicinam ipsam aggredi. Quamobrem Collegio Medicorum Londinensium se probandum obtulit anno 1712, a quo facta prius de more peritiae suae periclitatione licentiam faciendae Medicinae impetravit. Sunt enim Londini duo Medicorum ordines, quorum alii Socii sunt Collegii, alii a Collegio tantum Permissi sunt, seu Licentiati. Socius nemo, nisi Doctoris gradum in Anglicis Academiis, Oxoniensi vel Cantabrigiensi, obtinuerit. Caeteri omnes, qui in Academiis Scotiae, Hiberniae, vel externarum regionum ad Doctoratus honores promoti sunt, Licentiatorum tantum nomine a Collegio permittuntur, si doctrinam prius periclitatione probaverint. *Imo suspicio est quosdam interdum permitti sunt, quod magis miror, qui nulla academia doctoratus insignia consecuti sunt.*" Turner had his degree from the non-existent Yale Medical School in 1723.[12]

[12] For an interesting account of Turner: Daniel Turner and the First Degree of Doctor of Medicine conferred in the English Colonies of North America by Yale College in 1723, by John E. Lane, Annals Med. Hist., II, 1919, p. 367.

But it is under the discussion of Turner's *Syphilis, The Second Part* etc., London, 1739, that Astruc vents his spleen. Turner, who eschewed the society of surgeons to court the favor of physicians, would turn over to the surgeons, according to the preface of his *Discourse on Gleets* (1729), one of the most difficult branches of medicine, the treatment of venereal disease. Astruc sizes up Turner as follows: Si Chirurgis favet ultra modum, Medicis parum aequus, ideo nempe quod mens errorem, quo semel est imbuta recens, servet diu, *ut odorem testa*, atque adeo Medicus ille ex Chirurgo repente factus hujus felis similis sit, quae fingitur in foeminam mutata, sed non mutatis moribus. A leopard never changes its spots. Bred a surgeon, always a surgeon.

Turner's synopsis of Boerhaave's *Aphrodisiacus Luisini* is not to be taken seriously. It bristles with errors. His chronology is often ridiculous, Torella (1497 and 1500) he dates 1521, Matthiolus (1535) he has 1598, etc. Then again his geography of the continent is frequently strange. Joannes Paschalis, Suessanus, from Suessa near Naples, he glibly dubs a Swede; Georgius Vella, Brixiensis, from Brescia near Venice, he has come from Brussels. Without practical value, the work is of interest because it comes from the pen of a Turner.

At the same time that Turner and Astruc were at work, John Armstrong, poet, brother to George of pediatric fame, was preparing a synopsis of Boerhaave's *Luisinus*.[18] He is a man of a different kidney from Turner. His is a nature which leads one to deal gently with him. He modestly admits: " After I had finished my proposed Task, I conceived that the Performance would be quite lame, at this Time of the Day, without the Addition of Dr. Astruc's Book upon the same Subject." So in addition to translating Boerhaave's preface to the *Aphrodisiacus*, he appends an " Abstract of Dr. Astruc's Book, De Morbis Venereis." He compliments Astruc: " This Gentleman seems with indefatigable Pains to have exerted the Abilities of a skilful Physician in furnishing out an Account of Venereal Diseases in all of their various Appearances, together with the Method of

[18] A Synopsis of the History & Cure of Venereal Diseases. London. Printed for A. Millar, at Buchanan's Head, over-against St. Clement's Church in the Strand. 1737.

Cure proper to each Kind; and in my Opinion his success has not been inferior to his Industry; for if I have done him tolerable Justice, I presume few Readers will scruple to prefer him before any Author in the Venetian Collection [possibly a dubious compliment as Astruc was writing two centuries later], both as he abounds in curious and useful Materials, and has laid them out in a regular Manner. However faulty he may sometimes be found in Point of Theory, which has always been liable to be controverted, I believe the most judicious Practitioners will commonly allow that his Practice is good almost throughout."

Astruc, in turn, is mild in his criticism of the *Synopsis*. He does not embarass Armstrong by pointing out his strange geography, which corresponds to that of Turner. "Auctor ille tertius est, qui eodem circiter tempore ad Scriptores Aphrodisiacos in compendium contrahendos aggressus sit, majore sane diligentia, quam aut Ego, aut Turnerus." But often Armstrong is overscrupulous in his synopses. To Astruc's way of thinking, there is nothing to be gained from detailing antequated methods of treatment. For him the only important information to be gained from these old works is in connection with the origin and history of the disease, the order of appearance of various symptoms at various epochs.

Finally, a half century later, Christian Gottfried Gruner, professor at Jena, brought out a third volume to Luisinus: Aphrodisiacvs sive de lue venerea in dvas partes divisvs, qvarvm altera continet eivs vestigia in veterum avctorvm monimentis obvia, altera qvos Aloysivs Lvisinus temere omisit scriptores et medicos et historicos ordine chronologico digestos, collegit, notvlis instrvxit, glossarivm indicemque rervm memorabilivm svbiecit D. Christianvs Gothfridvs Gruner . . . Tomus Tertius [i. e. to Luisinus], Jenae, 1789, folio. In his preface, Gruner notes some of the early attempts at publishing collections of works dealing with *Morbus Gallicus*. He remarks: "Neque, ut inter omnes constat, defuerunt inde ab eo tempore, quo turpissima lues hominum corpora et ora foedavit, qui dispersas et facile perituras opellas uno complecterentur volumine. Hinc variae natae sunt col-

[14] He did not see the spurious edition of 1599. He wrongly dates it 1559. For a sympathetic biography of the eccentric and prolific Gruner: A. W. E. Henschel, C. G. Gruner's literarischer und persöhnlicher Charakter, Janus, I, 1846, p. 832.

lectiones, eaque hodie maximam partem rarissimae. Ecce vero singularum inscriptionem!" But besides the three editions of Luisinus,[14] he knows only the Pavian collection of 1516 and this he has never seen. The first part of Gruner's *Aphrodisiacus* contains fragments from old authors dealing with venereal disease, Jews, Greeks, Arabs and Arabists. The second part contains fragments and complete works from authors contemporary with the supposed great epidemic of the last years of the fifteenth and the early sixteenth centuries. Here are the authors whom Luisinus had *rashly* omitted from his collection. Especially well represented are the early German syphilographers, Schellig, Grünpeck, Widmann, Steber.

How shall we judge the tomes of Luisinus today? Unquestionably they have all the faults which the astute Astruc pointed out. These faults are all deplorable to the syphilohistorian. Used as a source book, it has led to grave errors. The Massa of 1532 is far different from the edition reprinted in Luisinus. But Luisinus never intended to present a work of historical value, it was to serve as a textbook of practical knowledge for the physician of the last half of the sixteenth century. Under the influence of Boerhaave, it again became a much valued text. That it again served as a source of clinical and therapeutic knowledge for practitioners two centuries after the appearance of the original imprint, reflects the lack of progress of syphilology during that long interval. Luisinus certainly presents the great physicians of his day, Fracastor, Fernel, Falloppius and others. He strikes the keynote of his efforts when, on his title page, he designates his work as an "opus hac nostra aetate, qua morbi gallici vis passim vagatur a prime necessarium." That he omitted such authors as Widmann, Villalobos and Grünpeck, that he lopped off prefaces and dedicatory letters, does not detract a whit from the value of his work considered from such a standpoint. He aimed to help the physician to combat a disease which was playing havoc on every side. Luisinus accomplished his purpose in a most commendable and thorough fashion. His tomes continue to hold a place as monumental pieces of labor in syphilography.

COLLECTIONS OF SYPHILOLOGIC TREATISES UP TO THE TWO TOMES OF ALOYSIUS LUISINUS

Collection	Authors	Printer	Place	Year	Astruc	Proksch
2 Collectio Veneta Prima	*Gattinaria** *Blasius* Aquilanus Leonicenus Scanarolus Benivenius Almenar	Sumptibus heredum Octaviani Scoti et sociorum Folio	Venice	1516	Not listed	Collectio Veneta Prima
2 Collectio Papiensis	Leonicenus Almenar Bologninus *Alexander Benedictus* *Dominicus Massaria*	Ex officina Bernhardini de Garaldis Folio	Pavia	1516	Collectio Prima	Col. Papiensis Secunda
3 Collectio Bononiensis	*Pliny* (Pseudo-) Almenar Leonicenus Bologninus *Alexander Benedictus* *Dom.* [*Massaria*] *Arcignaneus*	Hieronymus de Benedictus Folio	Bologna	1516	Not listed	Not listed
4 Collectio sine loco	Massa Almenar Leonicenus Bologninus	? 8vo.	Venice?	1532	Col. Secunda	Collectio sine loco
5 Collectio Veneta Secunda	Leonicenus Hutten Matthiolus Phrisius Almenar Bologninus Poll	Per Johannem Patavinum et Venturinum de Ruffinellis 8vo	Venice	1535	Col. Tertia aut Veneta Prima	Collectio Veneta II
6 Collectio Basileensis	Matthiolus Almenar Massa Poll Benedictus Victorius Bologninus	A Johanne Bebelio 4to	Basle	1536	Col. Quarta	Col. Basil. I
7 Collectio Lugdunensis	Same as 6	Expensis Scipionis de Gabiano et fratrum 8vo	Lyons	1536	Col. Quinta	Col. Lugdunensis
8 Collectio Veneta tertia Collectio Aloysii Luisini		Apud Jordanum Zilettum Folio	Venice	1566-1567	Col. Sexta aut Veneta Secunda	

*The authors in Italics are those whose treatises contain nothing on syphilis.

JOHN ELLIOTSON
PHYSICIAN AND HYPNOTIST

GEORGE ROSEN, M. D.

Anyone who has had the opportunity to glance through one of the early editions of Thackeray's *Pendennis* will very probably have noticed the dedication. It is addressed:

To Dr. John Elliotson

My Dear Doctor,

Thirteen months ago when it seemed likely that this story had come to a close a kind friend brought you to my bedside, whence in all probability I should never have risen but for your constant watchfulness and skill. I like to recall your great goodness and kindness (as well as many acts of others, showing quite a surprising friendship and sympathy) at that time, when kindness and friendship were most needed and welcome.

And as you would take no other fee but thanks, let me record here in behalf of me and mine, and subscribe myself

Yours, most sincerely and gratefully,

W. M. Thackeray.

I had encountered the name of Dr. John Elliotson once before * and so I was curious to find out something about him. What I found was very interesting.

John Elliotson had been born in London on the 29th of October, 1791. He was the son of a chemist-druggist and was educated privately. He then went to Edinburgh for further study and subsequently entered Jesus College, at Cambridge. Elliotson then attended St. Thomas' and Guy's Hospitals for three years at the end of which time he was elected as assistant at Guy's. In 1821 he received his M. D. degree.

* Vide Rosen, G.—"Die Aufnahme der Entdeckung William Beaumont's durch die europäische Medizin." Berlin, 1935, pp. 28; 59.

Elliotson was an original and sometimes eccentric individual. Some of his so-called eccentricities were rather trivial matters but to his tradition bound colleagues they must have appeared more important than they do today. Such for example was the fact that in 1826 he discarded the traditional garb of the English physicians —knee-breeches and silk stockings. Elliotson was also one of the first to re-introduce the fashion of wearing beards into England.

In 1829 he was requested to deliver the Lumley lectures before the Royal College of Physicians. Elliotson did so taking as his subject, " The Recent Improvements in the Art of Distinguishing the Various Diseases of the Heart." The lectures were divided into three parts: first, on the diseases of the external membrane of the heart; second, on the diseases of the internal membrane of the heart; and third, on the diseases of the substance of the heart and the aorta. They were published in 1830 in book form illustrated by a series of beautiful plates on the pathology of the heart.

Laennec had only recently introduced auscultation (1819) and Elliotson defends the new method against its opponents. "Auscultation, however, can never justify us in the least neglect of the general symptoms and history of the disease. This would indeed be unphilosophical; for the symptoms of auscultation are but one set among a number of others. But if to neglect the general symptoms were unphilosophical, it would be equally so to despise those which present themselves to the ear. If the functions of the heart and lungs are naturally performed with peculiar sounds, and in diseases the sounds are altered these deviations surely demand equal attention with those discernible by the other senses. Surely the physician requires all his senses for the acquisition of knowledge as much as other prosecutors of natural science. We employ our eyes to discern the countenance and general aspect of our patients, the changes of the pectoral, intestinal and renal secretions; the alterations of the color, size and figure of various parts. We employ our touch to examine the pulse, to ascertain the preternatural presence of fluid, preternatural enlargement, diminution and induration. Our smell gives us information as to the depraved secretions of fever, as to suppuration and gangrene; even some have recourse to the sense of taste in diabetes. Nay, certain symptoms observ-

able by the ear only, are always, carefully dwelt upon . . . all the varieties of cough and wheezing are described. Why then should such sounds as are elicited by striking the chest, or require the ear to be brought either in contact with it or in connexion by a solid medium, be despised?"

By 1837 Elliotson had established his position and secured a reputation as one of the ablest physicians in London. His active and inquisitive mind was continually exercised on new ideas and phenomena. Thus at the University College Hospital he carried out various therapeutic experiments, giving patients large doses of drugs usually considered to be dangerous. The results of these experiments were that nothing happened to the patients and that he excited the enmity of his colleagues by alarming them. In 1831 Elliotson had been appointed professor of the practice of medicine in the University of London. A great deal of his time and energy were devoted to the establishment of the University College Hospital.

Elliotson was a very popular lecturer and his lectures were reported regularly in the Lancet. This fact and his generally progressive attitude in medicine added to their popularity and increased his eminent standing and his practice as a consulting physician. He adopted the new method of auscultation very early and bec very skillful in its use. Elliotson was also the first to use the new instrument of auscultation, the stethoscope.

He was active in medical societies and was elected president of the Royal Medical and Chirurgical Society of London. Elliotson also published several books among them the aforementioned Lumleian lectures and a translation of Blumenbach's Physiology to which he appended numerous comprehensive notes. In 1839 he brought out his "Principles and Practice of Medicine."

One of Elliotson's prime interests was the study of nervous phenomena. This was to lead him into the paths of medical pseudoscience. He became a student of phrenology and founded the Phrenological Society of London. His preoccupation with phrenology led him finally to the doctrines of Mesmer. Elliotson became an ardent student of Mesmerism. He held seances at his house which were very well attended, largely by the fashionable classes of London.

The results obtained by practicing on patients who were epileptics or designing frauds were probably very questionable.

Elliotson's profession of belief in Mesmerism, however, and the seances held at his house led to differences with his colleagues. As a result he resigned from his professorship in 1838. He continued to practice Mesmerism on his patients and retained a very large practice. He also supported many experiments dealing with the subject and in 1843 he published a report of operations performed on people in a Mesmeric trance. The title of the report was as follows: "Numerous Cases of Surgical Operations without pain in the Mesmeric State with Remarks upon the opposition of many members of the Royal Medical and Chirurgical Society and Others to the Reception of the inestimable Blessings of Mesmerism by John Elliotson, London, 1843." An American edition was published in Philadalphia in the same year. Very interesting is the report of a "Case of amputation of a leg above the knee, without pain in the Mesmeric state."

Elliotson continued the practice of Mesmerism for a number of years. In 1849 he established a Mesmeric hospital. During this entire period he received crowds of people at his house before whom these phenomena were exhibited. If any patient or consulting physician showed any interest in Mesmerism, he was at once given complete instructions as to the manner of producing the Mesmeric state. Among other projects to advance and spread the Mesmeric doctrines Elliotson started a magazine called the *Zoist*. It was continued for a complete thirteen volumes.

As a physician Elliotson was a kindly and sympathetic individual and the effect of his personality on a patient may be seen in Thackeray's dedication quoted at the beginning of this sketch. He died July 29, 1868 in London.

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MEDICO-HISTORICAL ACTIVITIES IN THE UNITED STATES

INDIANA

Purdue University, LAFAYETTE

Dr. John Rathbone Oliver will give a series of lectures during the month of June at Purdue University. These lectures are to be given in connection with the Science and Leadership Institute of Purdue and will deal with the application to human relationships of the natural and social sciences.

MASSACHUSETTS

The medical profession of Springfield, Massachusetts observed the tercentenary of the founding of the city in a very dignified celebration that was held on May 18th. In the afternoon members of the profession made a pilgrimage to the old cemetery in Agawam where they placed a wreath on the grave of Dr. John Leonard, the first physician with an M. D. degree to practice in the Springfield settlement. In the evening a banquet was held at which Dr. Sigerist gave a short talk on "Why We Study the History of Medicine" which was broadcast over the local station, WMAS. At 8.30 p. m. a meeting was held in the Auditorium of the Technical High School in presence of the members of the City Government, the medical and the nursing professions. After the introductory remarks of Dr. George L. Schadt, Dr. Sigerist read a paper on "The Development of Medicine and Its Trends in the United States, 1636-1936."

NEW YORK

The Department of Hospitals of the City of New York celebrated two hundred years of New York hospital service on May 12th in the New York Academy of Medicine. Dr. S. S. Goldwater, Commissioner of Hospitals, opened the meeting whereupon addresses were given by Dr. Henry E. Sigerist, Dr. George E. Vincent and Mayor LaGuardia.

MARYLAND

JOHNS HOPKINS UNIVERSITY, BALTIMORE

Institute of the History of Medicine

PUBLICATIONS OF THE INSTITUTE OF THE HISTORY OF MEDICINE, 1935-1936

Brooke, Helen C.; The early history of vaccination in Maryland. Baltimore Health News, 1936, xiii, 18-22.

Edelstein, Ludwig; Winckelmann and the translation of Dioscurides. Bull. Inst. Hist. of Med., 1936, iv, 261-263.

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SOCIAL PROBLEMS FORUM

During the academic year, 1935-1936, the Social Problems Forum held twelve meetings. The following subjects were discussed:

1935

November 8th—"The Early History of the Johns Hopkins Medical School." Dr. Alan M. Chesney.

December 6th—"Preventive Medicine in Evolution." Dr. Allen W. Freeman.

1936

January 10th—"The Protection of Health in the Soviet Union." Dr. Henry E. Sigerist.

January 24th—"The Development of Public Health Work in the Eastern Health District of Baltimore." Dr. H. S. Mustard.

February 14th—"The Social Aspects of the Control of Syphilis." Dr. J. Earle Moore.

February 28th—"Housing in Elizabethan England." Dr. Sanford V. Larkey.
"Should Housing be a Public Utility?" Dr. Ivan E. McDougle.

March 13th—"Genetics, Sterilization, and the Social Order." Dr. Mark Graubard.

March 26th—"Science, Medicine, and the Common Life." Dr. Anton J. Carlson.

April 3rd—"Will the Recent Neutrality Legislation Keep Us Out of War?" Mr. Frederick J. Libby.

April 23rd—"The Introduction of Modern Medicine and Education into Rural China." Dr. G. Canby Robinson.

May 8th—"Social Applications of the Work of the Permanent Commission on Nutrition of the League of Nations." Dr. E. V. McCollum.

May 15th—"Economic Security against Sickness." Dr. I. S. Falk.

H. E. S.